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1 ABOUT LEAD FREE SOLDER (PbF: Pb free) Note:

In the information below, Pb, the symbol for lead in the periodic table of elements, will refer to standard solder or solder that contains lead.

We will use PbF solder when discussing the lead free solder used in our manufacturing process which is made from Tin (Sn), Silver (Ag), and Copper (Cu).

This model, and others like it, manufactured using lead free solder will have PbF stamped on the PCB. For service and repair work we suggest using the same type of solder although, with some precautions, standard Pb solder can also be used.

Caution

- PbF solder has a melting point that is 50°F ~ 70° F (30°C ~ 40°C) higher than Pb solder. Please use a soldering iron with temperature control and adjust it to 700°F ± 20° F (370°C ± 10°C). In case of using high temperature soldering iron, please be careful not to heat too long.

- PbF solder will tend to splash if it is heated much higher than its melting point, approximately 1100°F (600°C).

- If you must use Pb solder on a PCB manufactured using PbF solder, remove as much of the original PbF solder as possible and be sure that any remaining is melted prior to applying the Pb solder.

- When applying PbF solder to double layered boards, please check the component side for excess which may flow onto the opposite side (See the figure below).

1.1 Suggested PbF Solder

There are several types of PbF solder available commercially. While this product is manufactured using Tin, Silver, and Copper (Sn+Ag+Cu), you can also use Tin and Copper (Sn+Cu), or Tin, Zinc, and Bismuth (Sn+Zn+Bi). Please check the manufacturer′s specific instructions for the melting points of their products and any precautions for using their product with other materials.

The following lead free (PbF) solder wire sizes are recommended for service of this product: 0.3mm, 0.6mm and 1.0mm.

1.2 How to Recognize that Pb Free Solder is Used (Example: Handset P.C.B.) (Component View) Note:

The location of the “PbFö mark is subject to change without notice.

ICs and LSIs are vulnerable to static electricity.

When repairing, the following precautions will help prevent recurring malfunctions.

1. Cover plastic parts boxes with aluminum foil.
2. Ground the soldering irons.
3. Use a conductive mat on worktable.
4. Do not grasp IC or LSI pins with bare fingers.

3 CAUTION

1. Danger of explosion if battery is incorrectly replaced.
2. Replace only with the same or equivalent type recommended by the manufacturer.
3. Dispose of used batteries according to the manufacturer•s Instructions.

4 BATTERY 4.1 Battery Installation 4.2 Battery Charge 4.3 Recharging the Battery Note for service:

The battery strength may not be indicated correctly if the battery is disconnected and connected again, even after it is fully charged. In that case, by recharging the battery as mentioned above, you will get a correct indication of the battery strength.

4.4 Battery Strength 4.5 Battery Replacement 4.6 Battery Performance

5 LOCATION OF CONTROLS 5.1 Base Unit 5.2 Handset 5.2.1 How to Use the Soft Keys/Navigator key 5.3 Charger Unit

6 DISPLAYS 6.1 Display Items 6.2 Menu Icons 6.3 Troubleshooting (Handset LCD) Cross Reference:

(*1) Copying Phonebook Items ( )

(*2) Canceling the Handset Registration ( )

(*3) Erasing Items in the Phonebook ( )

Cross Reference:

(*4) Reregistering the Handset ( )

(*5) Erasing Items in the Phonebook ( )

7 SETTINGS 7.1 Connections 7.2 Connecting an Optional Headset 7.3 Guide to Handset Programming 7.4 Date and Time 7.5 Display Language 7.6 Dialing Mode 7.7 Line Mode 7.8 FLASH Button 7.9 Voice Enhancer 7.10 Ringer Tone 7.10.1 Handset Ringer Tone 7.10.2 Base Unit Ringer Tone 7.11 Direct Commands Cross Reference:

Reregistering the Handset ( )

Cross Reference:

Handset Ringer Tone ( )

8 OPERATION 8.1 Phonebook 8.1.1 Adding Items to the Phonebook 8.1.2 Storing Caller Information into the Phonebook 8.1.3 Calling Someone in the Phonebook Note:

*: Refer to Adding Items to the Phonebook ( )

8.1.4 Editing Items in the Phonebook Note:

*: Refer to Adding Items to the Phonebook ( )

8.1.5 Erasing Items in the Phonebook 8.1.6 Chain Dial Note:

*: Refer to Calling Someone in the Phonebook ( )

8.2 Copying Phonebook Items

You can copy one or all of the phonebook items from the handset to the phonebook of another handset.

Important:

- Make sure the destination handset is not in use.
- Do not place your handset on the base unit or charger until copying has finished, otherwise copying will stop.
- If an outside call is received during the phonebook copy, copying will stop. You will need to copy the item(s) later.
- Ringer ID and light-up ID settings for phonebook items are not copied.

8.2.1 Copying an Item Note:

*: Refer to Calling Someone in the Phonebook ( )

8.2.2 Copying All Items 8.3 Caller ID Service 8.3.1 For Call Waiting Service Users 8.3.2 Caller List 8.3.2.1 Erasing Caller Information 8.3.3 Talking Caller ID 8.4 PAUSE Button (For PBX/Long Distance Service Users)

9 ANSWERING SYSTEM

The unit contains an answering system which can answer and record calls for you when you are unavailable to answer the phone.

Important:

- Only 1 person can access the answering system (listen to messages, record a greeting message, etc.) at a time.
- When callers leave messages, the unit records the day and time of each message. Make sure the date and time have been set.
- You can select the caller's recording time.

9.1 Recording Your Greeting Message 9.2 Turning the Answering System On/Off 9.3 Caller's Recording Time 9.4 Message Alert 9.5 Listening to Messages 9.5.1 Listening to Messages Using the Base Unit 9.5.2 Listening to Messages Using the Handset 9.5.3 Answering System Commands 9.6 Remote Operation 9.6.1 Using the Answering System Remotely 9.6.2 Remote Code 9.6.3 Remote Commands

10 TROUBLESHOOTING

If the handset display shows error messages, see “ Troubleshooting (Handset LCD) ( )ö for the Cause & Solution.

10.1 General Use Cross Reference:

(*1) Battery Installation ( )

(*2) Connections ( )

(*3) Battery Charge ( )

(*4) Reregistering the Handset ( )

10.2 Programmable Settings Cross Reference:

(*1) Battery Charge ( )

10.3 Making/Answering Calls, Intercom Cross Reference:

(*1) Dialing Mode ( )

(*2) Connecting an Optional Headset ( )

10.4 Phonebook 10.5 Caller ID Cross Reference:

(*1) Caller ID Service ( )

10.6 Answering System Cross Reference:

(*1) Remote Code ( )

(*2) Turning the Answering System On/Off ( )

(*3) Listening to Messages Using the Base Unit ( )

(*4) Caller’s Recording Time ( )

(*5) Message Alert ( )

(*6) Date and Time ( )

10.7 Battery Recharge Cross Reference:

(*1) Battery Charge ( )

(*2) Battery Replacement ( )

10.8 Power Failure Cross Reference:

(*1) Connections ( )

11 DISASSEMBLY INSTRUCTIONS 11.1 Base Unit
11.2 Handset
11.3 Charger Unit

12 ASSEMBLY INSTRUCTIONS 12.1 Fix the LCD and the Receiver Guide to the Main P.C. Board (Handset)

13 TROUBLESHOOTING GUIDE Cross Reference:

Check Power ( )

Error Message Table ( )

Check Playback ( )

Check Record ( )

Check Sp-phone Transmission ( )

Check Sp-phone Reception ( )

Check Battery Charge ( )

Check Link ( )

Check the RF part ( )

Check Handset Transmission ( )

Check Handset Reception ( )

Check Caller ID ( )

Note:

(*1) When a user claims that the unit disconnects a call right after the greeting message and no incoming messages can be recorded, this symptom can not be reappeared with TEL simulator in the service center. So in that case try Check Record ( ) item (C).

13.1 Check Power Cross Reference:

Power Supply Circuit ( )

Reset Circuit ( )

Note:

Flash Memory is IC601.

DSP is IC501.

13.2 Error Message Table
Note:

Flash Memory is IC601.

DSP is IC501.

13.3 Check Record

c) How to change the Auto Disconnect activation (time)

Some Telephone Company lines (fiber or cable) ON Hook and OFF Hook voltages are lower than conventional lines, which may cause a malfunction of Auto Disconnect detection. To solve this problem, try changing the Auto Disconnect activation through the procedures below.

*If the “Disableö is selected, even if the parallel-connected telephone is OFF HOOK, the line isn′t disconnected.

d) How to change the VOX level

Cross Reference:

SIGNAL ROUTE ( )

Telephone Line Interface ( )

Auto Disconnect Circuit ( )

Parallel Connection Detect Circuit ( )

Note:

Flash Memory is IC601.

DSP is IC501.

13.4 Check Playback Cross Reference:

Power Supply Circuit ( )

Note:

Flash Memory is IC601.

DSP is IC501.

13.5 Check Sp-phone Transmission Cross Reference:

SIGNAL ROUTE ( )

Telephone Line Interface ( )

Note:

Flash Memory is IC601.

DSP is IC501.

13.6 Check Sp-phone Reception Cross Reference:

Telephone Line Interface ( )

SIGNAL ROUTE ( )

Note:

Flash Memory is IC601.

DSP is IC501.

13.7 Check Battery Charge Note:

Flash Memory is IC601.

DSP is IC501.

13.8 Check Link Note:

Flash Memory is IC601.

DSP is IC501.

(*1) Refer to Finding out the Defective part ( ).

Cross Reference:

Check the RF part ( )

13.9 Check the RF part 13.9.1 Finding out the Defective part After All the Checkings or Repairing

1. After all the checkings or repairing, cancel the Registration of Regular HS to checked Base Unit, and checked Handset to Regular BU.

2. Re-register the checked Handset to the checked Base Unit, and Regular HS to Regular BU.

Note:

(*1) HS: Handset

(*2) BU: Base Unit

13.9.1.1 Canceling the Handset Registration 13.9.1.2 Reregistering the Handset 13.9.2 RF Check Flowchart

Each item (1 ~ 6) of RF Check Flowchart corresponds to Check Table for RF part ( ).

Please refer to the each item.

13.9.3 Check Table for RF part
No.No. ItemItem BU (Base Unit) CheckBU (Base Unit) Check HS (HandSet) CheckHS (HandSet) Check
11
Note:

(*1)(*3)(*4) ADJUSTMENT AND TEST MODE ( )

(*2) RF-DSP Interface Signal Wave Form ( )

(*5) Base Unit Reference Drawing ( )

(*6) Handset Reference Drawing ( )

(*7) X501 (Base Unit), X201 (Handset) Check ( )

13.9.4 TEST RANGE Check

Circuit block which range is defective can be found by the following check.

ItemItem BU (Base Unit) CheckBU (Base Unit) Check HS (HandSet) CheckHS (HandSet) Check
CHART1: Setting of TX Power and RX Sensitivity in Range Confirmation TX TEST, RX TEST
BU (to be checked)BU (to be checked) Regular_HSRegular_HS TX PowerTX Power RX Sens.RX Sens. TX PowerTX Power RX Sens.RX Sens.
BU (Base Unit) TX Power CheckBU (Base Unit) TX Power Check HighHigh HighHigh HighHigh
HS (to be checked)HS (to be checked) Regular_BURegular_BU TX PowerTX Power RX Sens.RX Sens. TX PowerTX Power RX Sens.RX Sens.
HS (Handset) TX Power CheckHS (Handset) TX Power Check HighHigh HighHigh HighHigh
Note:

(*1) ADJUSTMENT AND TEST MODE ( )

13.9.5 RF-DSP Interface Signal Wave Form <Test Burst Mode> <Test Burst Mode> 13.10 Check Handset Transmission Cross Reference:

SIGNAL ROUTE ( ).

13.11 Check Handset Reception Cross Reference:

SIGNAL ROUTE ( ).

Note:

When checking the RF part, Refer to Check the RF part ( )

13.12 Check Caller ID Cross Reference:

Telephone Line Interface ( ).

Calling Line Identification (Caller ID)/Call Waiting Caller ID ( ).

Note:

- Make sure the format of the Caller ID or Call Waiting Caller ID service of the Telephone company that the customer subscribed to.
- Also we recommend to confirm that the customer is really a subscriber of the service.

14 ADJUSTMENT AND TEST MODE 14.1 Test Mode Flow Chart for Base Unit 14.1.1 Test Burst Mode Note:

(*1) LCD displays the Channel number.

(*2) Refer to Check Table for RF part ( ) and RX-CW Test Mode ( ) for proper Handset settings.

14.1.2 RX-CW Test Mode Note:

(*1) LCD displays the Channel number.

(*2) Refer to Check Table for RF part ( ) and Test Burst Mode ( ) for proper Handset settings.

14.1.3 Test Link Mode Note:

(*1) LCD displays the Channel number.

(*2) LCD displays the number of selected power.

(*3) Refer to Check Table for RF part ( ) and Test Link Mode ( ) for proper Handset settings.

14.1.4 Adjustment Mode Cross Reference

Check and Adjust X501 (Base Unit) Frequency ( )

Note:

(*1) This is an adjustment value (hex.).

14.2 Test Mode Flow Chart for Handset 14.2.1 Test Burst Mode Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

(*2) Refer to Check Table for RF part ( ) and RX-CW Test Mode ( ) for proper Base Unit settings.

14.2.2 RX-CW Test Mode Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

(*2) Refer to Check Table for RF part ( ) and Test Burst Mode ( ) for proper Base Unit settings.

14.2.3 Test Link Mode Note:

(*1) LCD displays the Channel number.

(exception: default/ CH00 = 1ch.)

(*2) for factory use only.

(*3) Refer to Check Table for RF part ( ) and Test Link Mode ( ) for proper Base Unit settings.

14.2.4 Adjustment Mode Cross Reference

(*1) Adjust Battery Low Detector Voltage (Handset) ( )

Note:

(*2) These are the default values.

(*3) These values may not be fixed depending on the battery strength.

14.2.5 LCD Contrast Adjustment 14.3 X501 (Base Unit), X201 (Handset) Check

Equipment: Frequency counter

Check Point for measurement: BCK

Checking tolerance: 13.824MHz ± 270Hz (Base Unit)/13.824MHz ± 100Hz (Handset)

14.3.1 Check and Adjust X501 (Base Unit) Frequency

1. Set up Base Unit in TEST mode.

2. Press following keys in order to Adjust Crystal mode. [INTERCOM], [INTERCOM], [INTERCOM], [1], [4]. Check BCK frequency.

3. If the BCK frequency is out of the checking tolerance (± 270Hz), adjust to Adjustment tolelance (± 30Hz) by pressing [ ] or [ ] key.

Adjustment Tolerance: 13.824MHz ± 30Hz

4. Press [INTERCOM] key to write the new frequency factor in Memory.

5. Turn the power off. Then this value is available.

Cross Reference:

Adjustment Mode ( )

14.3.2 Check and Adjust X201 (Handset) Frequency

1. Set DC power supply to 3.9V.

2. Set up Handset in TEST mode (Adjustment flow).

3. Press [1] key to Adjust Crystal mode (“Clock Adj.ö is displayed on LCD). Check BCK frequency.

4. If the BCK frequency is out of the checking tolerance (± 100Hz), adjust to Adjustment tolelance (± 30Hz) by pressing [ ] or [ ] key.

   Adjustment Tolerance: 13.824MHz ± 30Hz

5. Press [TALK] key to write the new frequency factor in EEPROM.

6. Turn the power off. Then this value is available.

Cross Reference:

Adjustment Mode ( )

14.4 Adjust Battery Low Detector Voltage (Handset)

After Handset•s DSP (IC201) or EEPROM (IC241) replacement, Re-writing Battery Low voltage to EEPROM is required.

With following Handset Adjustment Flow, adjust DC power supply and DC voltmeter by the procedure below.

1. Set DC power supply to 3.9V.

2. Set up Handset in TEST mode (Adjustment flow).

3. Press [1] key and [OFF] key to Adjust Batt Low mode. (“Bat Adj.ö is displayed on LCD)

4. Change the voltage of the DC power supply to 3.50V accurately. Check the voltage at P.C. board pads because some voltage drops occur due to the usage of long or thin cables.

5. Press [TALK] key to write voltage value in EEPROM.

6. Turn the power off. Then this value is available.

Note:

Refer to Handset Reference Drawing ( ) for connection of DC power supply and voltmeter.

Cross Reference:

Adjustment Mode ( )

14.5 Base Unit Reference Drawing

When connecting the Simulator Equipment for checking, please refer to below.

Note:

(*1) is referred to No.3 of Check Table for RF part ( )

14.6 Handset Reference Drawing

When connecting the Simulator Equipment for checking, please refer to below.

Note : (*1) is referred to No.3 of Check Table for RF part ( )

14.7 Frequency Table 14.7.1 Base Unit
ChannelChannel TX/RX Frequency (MHz)TX/RX Frequency (MHz) ChannelChannel TX/RX Frequency (MHz)TX/RX Frequency (MHz) ChannelChannel TX/RX Frequency (MHz)TX/RX Frequency (MHz)
11 5759.702398 5759.702398 3333 5788.242242 5788.242242 6565 5816.782086 5816.782086 22 5760.592291 5760.592291 3434 5789.132135 5789.132135 6666 5817.671978 5817.671978 33 5761.486139 5761.486139 3535 5790.025982 5790.025982 6767 5818.565826 5818.565826 44 5762.376031 5762.376031 3636 5790.915875 5790.915875 6868 5819.455719 5819.455719 55 5763.269879 5763.269879 3737 5791.809723 5791.809723 6969 5820.349566 5820.349566 66 5764.159771 5764.159771 3838 5792.699615 5792.699615 7070 5821.239459 5821.239459 77 5765.053619

5765.053619 3939 5793.593463 5793.593463 7171 5822.133307 5822.133307 88
5765.943512 5765.943512 4040 5794.483355 5794.483355 7272 5823.023199
5823.023199 99 5766.837359 5766.837359 4141 5795.377203 5795.377203 7373
5823.917047 5823.917047 1010 5767.727252 5767.727252 4242 5796.267096
5796.267096 7474 5824.806939 5824.806939 1111 5768.621100 5768.621100 4343
5797.160943 5797.160943 7575 5825.700787 5825.700787 1212 5769.510992
5769.510992 4444 5798.050836 5798.050836 7676 5826.590680 5826.590680 1313
5770.404840 5770.404840 4545 5798.944684 5798.944684 7777 5827.484527
5827.484527 1414 5771.294732 5771.294732 4646 5799.834576 5799.834576 7878
5828.374420 5828.374420 1515 5772.188580 5772.188580 4747 5800.728424
5800.728424 7979 5829.268268 5829.268268 1616 5773.078473 5773.078473 4848
5801.618316 5801.618316 8080 5830.158160 5830.158160 1717 5773.972320
5773.972320 4949 5802.512164 5802.512164 8181 5831.052008 5831.052008 1818
5774.862213 5774.862213 5050 5803.402057 5803.402057 8282 5831.941900
5831.941900 1919 5775.756060 5775.756060 5151 5804.295904 5804.295904 8383
5832.835748 5832.835748 2020 5776.645953 5776.645953 5252 5805.185797
5805.185797 8484 5833.725641 5833.725641 2121 5777.539801 5777.539801 5353
5806.079644 5806.079644 8585 5834.619488 5834.619488 2222 5778.429693
5778.429693 5454 5806.969537 5806.969537 8686 5835.509381 5835.509381 2323
5779.323541 5779.323541 5555 5807.863385 5807.863385 8787 5836.403228
5836.403228 2424 5780.213434 5780.213434 5656 5808.753277 5808.753277 8888
5837.293121 5837.293121 2525 5781.107281 5781.107281 5757 5809.647125
5809.647125 8989 5838.186969 5838.186969 2626 5781.997174 5781.997174 5858
5810.537018 5810.537018 2727 5782.891021 5782.891021 5959 5811.430865
5811.430865 2828 5783.780914 5783.780914 6060 5812.320758 5812.320758 2929
5784.674762 5784.674762 6161 5813.214605 5813.214605 3030 5785.564654
5785.564654 6262 5814.104498 5814.104498 3131 5786.458502 5786.458502 6363
5814.998346 5814.998346 3232 5787.348394 5787.348394 6464 5815.888238
5815.888238

14.7.2 Handset

ChannelChannel TX/RX Frequency (MHz)TX/RX Frequency (MHz) ChannelChannel TX/RX Frequency (MHz)TX/RX Frequency (MHz) ChannelChannel TX/RX Frequency (MHz)TX/RX Frequency (MHz)

11 5759.700425 5759.700425 3333 5788.240269 5788.240269 6565 5816.780113
5816.780113 22 5760.594273 5760.594273 3434 5789.134117 5789.134117 6666
5817.673960 5817.673960 33 5761.484165 5761.484165 3535 5790.024009 5790.024009
6767 5818.563853 5818.563853 44 5762.378013 5762.378013 3636 5790.917857
5790.917857 6868 5819.457701 5819.457701 55 5763.267906 5763.267906 3737
5791.807749 5791.807749 6969 5820.347593 5820.347593 66 5764.161753 5764.161753
3838 5792.701597 5792.701597 7070 5821.241441 5821.241441 77 5765.051646
5765.051646 3939 5793.591490 5793.591490 7171 5822.131333 5822.131333 88
5765.945494 5765.945494 4040 5794.485337 5794.485337 7272 5823.025181
5823.025181 99 5766.835386 5766.835386 4141 5795.375230 5795.375230 7373
5823.915074 5823.915074 1010 5767.729234 5767.729234 4242 5796.269078
5796.269078 7474 5824.808921 5824.808921 1111 5768.619126 5768.619126 4343
5797.158970 5797.158970 7575 5825.698814 5825.698814 1212 5769.512974

5769.512974 4444 5798.052818 5798.052818 7676 5826.592662 5826.592662 1313
5770.402867 5770.402867 4545 5798.942710 5798.942710 7777 5827.482554
5827.482554 1414 5771.296714 5771.296714 4646 5799.836558 5799.836558 7878
5828.376402 5828.376402 1515 5772.186607 5772.186607 4747 5800.726451
5800.726451 7979 5829.266294 5829.266294 1616 5773.080455 5773.080455 4848
5801.620298 5801.620298 8080 5830.160142 5830.160142 1717 5773.970347
5773.970347 4949 5802.510191 5802.510191 8181 5831.050035 5831.050035 1818
5774.864195 5774.864195 5050 5803.404039 5803.404039 8282 5831.943882
5831.943882 1919 5775.754087 5775.754087 5151 5804.293931 5804.293931 8383
5832.833775 5832.833775 2020 5776.647935 5776.647935 5252 5805.187779
5805.187779 8484 5833.727623 5833.727623 2121 5777.537828 5777.537828 5353
5806.077671 5806.077671 8585 5834.617515 5834.617515 2222 5778.431675
5778.431675 5454 5806.971519 5806.971519 8686 5835.511363 5835.511363 2323
5779.321568 5779.321568 5555 5807.861412 5807.861412 8787 5836.401255
5836.401255 2424 5780.215415 5780.215415 5656 5808.755259 5808.755259 8888
5837.295103 5837.295103 2525 5781.105308 5781.105308 5757 5809.645152
5809.645152 8989 5838.184996 5838.184996 2626 5781.999156 5781.999156 5858
5810.538999 5810.538999 2727 5782.889048 5782.889048 5959 5811.428892
5811.428892 2828 5783.782896 5783.782896 6060 5812.322740 5812.322740 2929
5784.672789 5784.672789 6161 5813.212632 5813.212632 3030 5785.566636
5785.566636 6262 5814.106480 5814.106480 3131 5786.456529 5786.456529 6363
5814.996373 5814.996373 3232 5787.350376 5787.350376 6464 5815.890220
5815.890220

14.8 How to Clear User Setting

Units are reset to the Factory settings by this operation (Erase recorded Voice messages, stored Phone numbers, Caller list and etc.).

This operation should not be performed for a usual repair.

14.8.1 Base unit Note:

(*1) Telephone line must be connected.

14.8.2 Handset Note:

(*1) Be sure to short the battery terminals of the Handset with a lead wire, etc. for 2 seconds for discharge after removing the battery.

15 DESCRIPTION 15.1 Frequency

The frequency range of 5.76GHz-5.84GHz is used. Transmitting and receiving channel between Base Unit and Handset is same frequency. Refer to Frequency Table ( ).

15.2 FHSS (Frequency Hopping Spread Spectrum)

This telephone is using an IC chip which has similar specification to WDCT (World Digital Cordless Telephone) and is the telephone system that can use multiple portable unit simultaneously. The explanation of this system is mentioned below. This system uses a Time Division Multiple Access/Time Division Duplex (TDMA / TDD) scheme:

transmitting and receiving frequencies of the Base Unit and Handset are shared in the same frequency. The construction of RX/TX frequency data is shown below. It consists of 4 slots from the Base Unit to the Handset, and 4 slots from the Handset to the Base Unit, total 8 slots in 10ms. By this slot system, simultaneous air link and communication between 4 Handsets and the Base Unit can be realized. One communication between Handset and the Base Unit is done by one slot from the Base Unit to Handset, and another slot from Handset to the Base Unit.

DSS makes spectrum spread by multiplying carrier signal by PN code. The purpose to make spectrum spread is to reduce power density per time and per band. On the other hand, FHSS makes spectrum spread by changing channel every 10ms according to Hopping table. Also the purpose to make spectrum spread is to reduce power density per time and per band.

15.2.1 TDD Frame Format

Sync Field (72bit): Preamble 56bit + SyncWord 16bit

Base Unit (Handset) adjusts the timing of reception so that reception of Base Unit (Handset) can correspond to transmission of Handset (Base Unit).

It is necessary for sync-field that Handset gets synchronization.

A - field (64bit): Each kinds of DATA: ch data, line condition, etc.

B - field (320bit + 80bit): Sound data + parity

Z - field (4bit): Parity Check

15.2.2 TDMA system

This system is the cycles of 10ms, and has four duplex paths, so it is possible to perform

four duplex communications simultaneously.

(Up to eight Handsets can be registered)

In 1 slot 1.25ms, the 10ms of voice data is transmitted.

Each slot makes every frame frequency hop. (100hops/sec.)

Although each slot (UpLink3 and UpLink4) uses different frequency, UpLink3 and DownLink3 use the same frequency.

- 2 - Handsets Link

Traffic Bearer

A link is established between Base Unit and Handset.

The state where duplex communication is performed.

The hopping pattern of a 3000hops (30 seconds) cycle.

Dummy Bearer

The Base Unit sends Dummy-data to the all stand-by state Handsets.

The Handsets receive that data for keeping synchronization and monitoring request from the Base Unit.

Dummy Bearer doesn•t contain B-field (sound) data.

15.3 Signal Flowchart in the Whole System Reception

CN101 of the Base Unit is connected to the TEL line, and signal is enter through the bridge diode D101. While talking, the relay (Q141) is turned ON and amplified at the Q171, then led to DSP (IC501). The DSP encodes ADPCM and TDD/TDMA with FHSS to TXMOD. The TXMOD signal is enter to IC701 of RF PART, and modulated to 2.4GHz. The 2.4GHz signal is up-converted to 5.8GHz RF signal by IC801. The RF signal is amplified by the power amplifier (IC851) and fed to Antennas.

As for the Handset, RF signal from the antenna is amplified by LNA (Q871). The amplified signal is down-converted to 2.4GHz signal by IC801 and led to IC701. The 2.4GHz is down-converted to IF signal in IC701. The IF signal passing through internal filter is demodulated into RXDATA, then enter to DSP (IC201). The DSP performs TDD/TDMA and ADPCM decoding to convert the RXDATA into the voice signal, then it is output to the speaker.

Transmission

The voice signal entering from the Handset microphone is led to DSP (IC201). The DSP encodes ADPCM and TDD/TDMA with FHSS to TXMOD. The TXMOD signal is enter to IC701 of RF PART, and modulated to 2.4GHz. The 2.4GHz signal is up-converted to 5.8GHz RF signal by IC801. The RF signal is amplified by the power amplifier (IC851) and fed to Antenna.

As for the Base Unit, RF signal from the Antennas is amplified by LNA (Q871). The amplified signal is down-converted to 2.4GHz signal by IC801 and led to IC701. The 2.4GHz is down-converted to IF signal in IC701. The IF signal passing through internal filter is demodulated into RXDATA, then enter to DSP (IC501). The DSP performs TDD/TDMA and ADPCM decoding to convert the RXDATA into the voice signal. The voice signal is amplified at the TX amplifier (Q161), then output to the TEL line CN101 through the relay (Q141) and bridge (D101).

16 EXPLANATION OF LINK DATA COMMUNICATION 16.1 Calling 16.2 To Terminate Communication 16.3 Ringing

17 BLOCK DIAGRAM (BASE UNIT_MAIN)

18 CIRCUIT OPERATION (BASE UNIT_MAIN) General Description:

(DSP, Flash Memory) is a digital speech/signal processing system that implements all the functions of speech compression, record and playback, and memory management required in a digital telephone answering machine.

The DSP system is fully controlled by a host processor DSP. The host processor provides activation and control of all that functions as follows.

18.1 DSP (Digital Speech/Signal Processing: IC501)

- Voice Message Recording/Play back

  The DSP system use a proprietary speech compression technique to record and store voice message in Flash Memory.

  An error correction algorithm is used to enable playback of these messages from the Flash Memory.

- DTMF Detection/Generator

  The DTMF detection is implemented by the DSP system in software. The DTMF detection is performed during Record, Play

  back, and Line Monitoring modes of operation.

  When the DTMF data from the Handset is received, the DTMF signal is output.

- Synthesized Voice (Pre-recorded message)

  The DSP implements synthesized Voice, utilizing the built in speech detector and a Flash Memory, which stored the vocabulary.

- Caller ID and Call Waiting CID demodulation

  The DSP implements monitor and demodulate the FSK signals that provide CID information from the Central Office.

- Analog Switching

  The voice signal from telephone line is transmitted to the speaker or the voice signal from speakerphone microphone is transmitted to the Telephone line, etc. They are determined by the signal path route operation of voice signal.

- Block Interface Circuit

  RF part, LED, Key scan, Speaker, Microphone, Telephone line, LCD.

18.2 Flash Memory (IC601)

Following information data is stored.

- Voice signal

  ex: Pre-recorded Greeting message, Incoming message, Talking Caller ID announcement

- Telephone number, etc.

  ex: Telephone Directory number, ID code

- Settings

  ex: message numbers, Flash Time, Tone/Pulse

18.3 Power Supply Circuit Function:

The power supply voltage from AC adaptor is converted to the desired voltage of each block.

Circuit Operation:

- Q300 and IC300: 4.0V DCDC Converter
- IC331: 3.3V Regulator

18.3.1 Charge Circuit

The voltage from the AC is supplied to the charge circuits. Main charge (180mA at the Battery) of maximum 6-hours is started soon after the Handset is placed on the Base Unit. Then it changes to Trickle charge to prevent from overcharging.

Q361 and Q362 detect the ON-HOOK state (Handset is placed on Base Unit).

Q371 and Q372 control the charge current.

Q373 sends a signal to the Handset for about 5 seconds soon after the Handset is placed on the Base Unit.

This signal tells that the Handset is being charged on the Base Unit or the charger.

When the signal is received: charged on the Base Unit

No signal: charged on the charger.

18.4 Reset Circuit Function:

This circuit is used to initialize the microcomputer when it incorporates an AC adaptor.

Circuit Operation:

When the AC Adaptor is inserted into the unit, then the voltage is shifted by IC331 and power is supplied to the DSP.

The set starts to operate when VCC goes up to 3.0V or more in the circuit voltage diagram.

Note:

(*1) The initializing time of the DSP chip is 26.6ms under normal conditions.

18.5 Intercom Mode

1. Press the Base Unit INTERCOM button, and the handset number button ([1] to [8]), then a monitor tone is heard from the speaker.

2. At the same time, the Handset ring. This status is called “Intercom stand-byö.

3. Then press TALK button of the Handset, the status is changed to “Intercom modeö.

18.6 Telephone Line Interface

Telephone Line Interface Circuit:

Function

- Bell signal detection
- ON/OFF hook and pulse dial circuit
- Side tone circuit

Bell signal detection and OFF HOOK circuit:

In the idle mode, Q141 is open to cut the DC loop current and decrease the ring load. When ring voltage appears at the Tip (T) and Ring (R) leads (When the telephone rings), the AC ring voltage is transferred as follows:

T → L101 → R111 → C111 → Q111 → DSP pin 3 [BELL]

When the CPU (DSP) detects a ring signal, Q141 turns on, thus providing an off-hook condition (active DC current flow through the circuit). Following signal flow is the DC current flow.

T → L101 → D101 → Q141 → Q161 → R163 → D161 → D101 → L102 → P101 → R

ON HOOK Circuit:

Q141 is open, Q141 is connected as to cut the DC loop current and to cut the voice signal. The unit is consequently in an on-hook condition.

Pulse Dial Circuit:

Pin 4 of DSP turns Q141 ON/OFF to make the pulse dialing.

Side Tone Circuit:

Basically this circuit prevents the TX signal from feeding back to RX signal. As for this unit, TX signal feed back from Q161 is canceled by the canceller circuit of DSP.

18.7 Auto Disconnect Circuit Function:

This circuit is used to detect the fact that another telephone connected to the same line is OFF-HOOK while the unit is in a receiving status or OGM transmitting status.

Circuit Operation:

The voltage of pin 35 of IC501 is monitored. If a parallel-connected telephone is put into OFF HOOK status, the presence/absence of a parallel connection is determined when the voltage changes by 0.2V or more. When the set detects the parallel-connected telephone is OFF HOOK status, the line is disconnected.

You can enable or disable the Auto Disconnect function.

See Check Record ( )

18.8 Parallel Connection Detect Circuit Function:

In order to disable call waiting and stutter tone functions when using telephones connected in parallel, it is necessary to have a circuit that judges whether a telephone connected in parallel is in use or not. This circuit determines whether the telephone connected in parallel is on hook or off hook by detecting changes in the T/R voltage.

Circuit Operation:

Parallel connection detection when on hook:

When on hook Q136 is ON, the voltage is monitored at pin 35 of IC501. There is no parallel connection if the voltage is

1.65 V or higher, while a parallel connection is deemed to exist if the voltage is lower.

Parallel connection detection when off hook:

When off hook Q136 is OFF, the voltage is monitored at pin 35 of IC501; the presence/absence of a parallel connection is determined when the voltage changes by 0.2 V or more.

18.9 Calling Line Identification (Caller ID)/Call Waiting Caller ID Function:

Caller ID

The caller ID is a chargeable ID which the user of a telephone circuit obtains by entering a contract with the telephone company to utilize a caller ID service. For this reason, the operation of this circuit assumes that a caller ID service contract has been entered for the circuit being used. The data for the caller ID from the telephone exchange is sent during the interval between the first and second rings of the bell signal. The data from the telephone exchange is a modem signal which is modulated in an FSK (Frequency Shift Keying) * format. Data “1ö is a 1200 Hz sine wave, and data.... a 2200 Hz sine wave. There are two types of the message format which can be received: i.e. the single message format and plural message format. The plural message format allows to transmit the name and data code information in addition to the time and telephone number data.

*: Also the telephone exchange service provides other formats.

Call Waiting Caller ID

Calling Identity Delivery on Call Waiting (CIDCW) is a CLASS service that allows a customer, while off-hook on an existing call, to receive information about a calling party on a waited call. The transmission of the calling information takes place almost immediately after the customer is alerted to the new call so he/she can use this information to decide whether to take the new call.

Function:

The telephone exchange transmits or receives CAS and ACK signals through each voice RX/TX route. Then FSK data and MARK data pass the following route.

Telephone Line → CN101(T, R) → C121, C122 → R121, R122 → IC501 (40, 39).

If the unit deems that a telephone connected in parallel is in use, ACK is not returned even if CAS is received, and the information for the second and subsequent callers is not displayed on the portable Handset display.

19 BLOCK DIAGRAM (BASE UNIT_RF PART)

20 BLOCK DIAGRAM (HANDSET_RF PART)

21 CIRCUIT OPERATION (RF PART) General Description:

RF part includes Transmitter and Receiver functions. Digital signals (Mainly voice data) that come from DSP, are modulated and are transmitted. On the other hand, received signals are demodulated and go out to DSP.

21.1 Power Supply Circuit

As indicated below, the various voltages are supplied to each block.

V_PA, about 4.0V at Base Unit or 3.3V at Handset, is supplied to the Power amplifier in 5.8GHz PA circuit.

IC841 is 3.0V Regulators, and IC761 is a 2.5V Regulator. They output Vcc_5.8GHz, and Vcc_2.4GHz respectively by order of RADIO_EN signal or CON_EN signal. V_RF is approximately 4.0V (Base Unit) or 3.6V (Handset).

21.2 2.4GHz Mod/Demod Circuit

IC701 incorporates all of the modulation and demodulation functions. TX Digital data (TX_DATA) from DSP is supplied to pin 27 of IC701, and then 2.4GHz TX modulated signal is output from pin1. This TX signal goes into the 5.8GHz Converter circuit. 2.4GHz RX signal from 5.8GHz Converter circuit is passed through matching circuit and supplied to pin4 of IC701, then demodulated signal (RX_DATA) comes out from pin 16. At the same time, RSSI (Received Signal Strength Indicator) outputs from the pin 14. Reference clock (13.824MHz) from DSP block is supplied to pin 11 of IC701. VCC_2.4G supplies 2.5V regulated voltage.

21.3 5.8GHz Converter Circuit

This block converts frequency of TX signal and RX signal.

IC801 includes TX-MIXER, RX-MIXER, PLL and VCO modules internally.

The VCO module is tuned by PLL synthesizer module, and generates 3.4GHz Local signal. Reference clock (13.824MHz) from DSP block is supplied to pin7 of IC701.

2.4GHz TX signal from 2.4GHz Mod/Demod circuit is supplied to pin 17 of IC801, and internal TX-MIXER multiplies it by 3.4GHz Local signal from internal VCO module, and up-converts into 5.8GHz TX signal. This 5.8GHz TX signal is output from pin 2, and goes into the 5.8GHz PA circuit.

5.8GHz RX signal from 5.8GHz LNA circuit supplied to pin 5 of IC801, and internal RX-MIXER multiplies it by 3.4GHz Local signal from internal VCO module, and down-converts into 2.4GHz RX signal. This 2.4GHz RX signal is output from pin 15, and goes into the

2.4GHz Mod/Demod circuits.

21.4 5.8GHz LNA (Low Noise Amplifier) Circuit

This block amplifies receiving 5.8GHz signal.

5.8GHz RX signal from Antenna Switch circuit amplified by LNA (Low Noise Amplifier) Q871 and filtered by HPF (FL821), and then supplied to 5.8GHz Converter circuit.

21.5 5.8GHz Power Amplifier and Antenna Switch Circuit

This block amplifies power of 5.8GHz TX signal.

5.8GHz TX signal from 5.8GHz Converter circuit is filtered by 5.8GHz-BPF FL811, and amplified by Power amplifier (PA) block of IC851, and then passes through internal 5.8GHz-BPF. After that, it is supplied to Antenna Switch block of IC851.

This block selects the TX 5.8GHz signal or RX 5.8G signal, and connect to Antenna terminal.

V_PA is approximately 4.0V at Base Unit, and 3.3V at Handset.

<Base Unit>

IC851 includes Switches for High frequency signals, and controlled by ANT0 signal and ANT 1 signal from DSP.

DSP is checking RSSI (Received Signal Strength Indicator) signal, and selects better condition Antenna from two antennas.

At the TX mode 5.8GHz TX signal from 5.8GHz PA block leads to selected Antenna terminal, at the RX mode 5.8GHz RX signal from selected Antenna terminal leads to 5.8GHz LNA circuit.

<Handset>

IC851 includes Switch for High frequency signals, and controlled by PA_CONT signal and RX_EN signal from DSP. At the TX mode 5.8GHz TX signal from 5.8GHz PA block leads to Antenna terminal, at the RX mode 5.8GHz RX signal from Antenna terminal leads to 5.8GHz LNA circuit.

22 BLOCK DIAGRAM (HANDSET)

23 CIRCUIT OPERATION (HANDSET) 23.1 Construction

The circuit mainly consists of DSP and RF part as shown in the block diagram.

23.1.1 DSP: IC201 Function

- Battery Low, Power down detect circuit
- Ringer Generation
- Interface circuit

  RF part, Speaker, Mic, LED, Key scan, LCD, Headset

Initialize Note:

(*1) The initializing time of the DSP chip is 20ms under normal conditions.

23.1.2 RF part

Mainly voice signal is modulated to RF, or it goes the other way.

23.1.3 EEPROM: IC241

All setting data is stored.

ex: ID code, user setting (Phonebook, Caller ID data)

23.1.4 Flash Memory: IC246

Following information data is stored.

- Ringer melody

23.2 Power Supply Circuit

Voltage is supplied separately to each block.

23.3 Charge Circuit

When the Handset is put on the cradle of the Base unit or the charger, the power is supplied from CHARGE+ and CHARGE- terminals to charge the battery via D353 and R368 or Q361. The voltage between CHARGE+ and CHARGE- flows R231 → Q231 → pin41 of IC201,

where the charge is detected. Then IC201 calculates the battery consumption amount from the previous charge, and it controls Q361/Q362/Q363 by pin79 of IC201 until charging is complete. When charging is complete, the control pattern is switched to Trickle charging form from Operational charging form.

23.4 Ringer and Handset SP-Phone 23.5 Sending Signal

The voice signal from the microphone is input to DSP (89, 90). CN331 is the headset jack. When the headphone is connected, the Q331 detect it. The input from the microphone of the Handset (MIN, MIP) is cut and the microphone signal from the headset is input to DSP (94). Also the power for the microphone is supplied from DSP (91) and the power is turned OFF on standby.

23.6 Reception Signal

The voice signal from the Base Unit is output to DSP (97) (HSSPOUT). This signal is led to the headset jack (CN331). The signal through the headset jack and the other signal output from DSP (96) drives the speaker. When the headset is inserted to the jack, the voice signal is cut at the jack, so the sound does not come out from the speaker, but from the headset only.

24 CIRCUIT OPERATION (CHARGER UNIT)

The voltage from the AC is supplied to the charge circuits. Main charge (180mA at the Battery) of maximum 6-hours is started soon after the Handset is placed on the Base Unit. Then it changes to Trickle charge to prevent from overcharging.

Charging form

Q4 detects the ON-HOOK state (Handset is placed on Base Unit), then Q5 turns ON and LED1 lights up.

Q2 and Q3 regulate the charge current.

The route for this is as follows: DC+pin of CN1→D1→Q30→L30→D2→CHARGE+pad →Handset→CHARGE pad→Q2→R4, R5, R9 and R10→DC pin of CN1.

25 SIGNAL ROUTE

Each signal route is as follows.

Each signal route is as follows.

RF part signal route

26 CPU DATA (BASE UNIT) 26.1 IC501
PINPIN DescriptionDescription I/OI/O HighHigh High_ZHigh_Z LowLow
11 LINE_SZLINE_SZ D.OD.O OnOn ---- OffOff 22 NOT_RLYNOT_RLY D.OD.O On HookOn Hook ---- Off HookOff Hook 33 BELLBELL D.ID.I OFFOFF ---- OnOn 44 RLYRLY D.OD.O Off HookOff Hook ---- On HookOn Hook 55 AC_DOWN _DETAC_DOWN _DET D.ID.I HighHigh ---- LowLow 66 KEY_STB_ FKEY_STB_ F D.OD.O ActiveActive NotNot ---- 77 KEY_STB_ EKEY_STB_ E D.OD.O ActiveActive NotNot ---- 88 KEY_STB_ DKEY_STB_ D D.OD.O ActiveActive NotNot ---- 99 KEY_STB_ CKEY_STB_ C D.OD.O ActiveActive NotNot ---- 1010 KEY_STB_ BKEY_STB_ B D.OD.O ActiveActive NotNot ---- 1111 KEY_STB_ AKEY_STB_ A D.OD.O ActiveActive NotNot ---- 1212 CHG_CTRLCHG_CTRL D.OD.O No ChargeNo Charge ---- ChargeCharge 1313 CHG_DETCHG_DET D.ID.I Off ChargeOff Charge ---- On ChargeOn Charge 1414 VCCVCC VCCVCC VCCVCC ---- ---- 1515 GNDGND GNDGND ---- ---- GNDGND 1616 KEY_IN_ 6KEY_IN_ 6 D.OD.O NonNon ---- Key InKey In 1717 KEY_IN_ 5KEY_IN_ 5 D.ID.I NonNon ---- Key InKey In 1818 KEY_IN_ 4KEY_IN_ 4 D.ID.I NonNon ---- Key InKey In 1919 KEY_IN_ 3KEY_IN_ 3 D.ID.I NonNon ---- Key InKey In 2020 KEY_IN_ 2KEY_IN_ 2 D.ID.I NonNon ---- Key InKey In 2121 KEY_IN_ 1KEY_IN_ 1 D.ID.I NonNon ---- Key InKey In 2222 INT_LEDINT_LED D.I.OD.I.O ---- OffOff OnOn 2323 SYN_DATASYN_DATA D.OD.O HighHigh ---- LowLow 2424 SYN_LE1SYN_LE1 D.OD.O NotNot ---- ActiveActive 2525 SYN_CLKSYN_CLK D.OD.O HighHigh ---- LowLow 2626 SYN_DISYN_DI D.ID.I HighHigh ---- LowLow 2727 SYN_LE2SYN_LE2 D.OD.O NotNot ---- ActiveActive 2828 GNDGND GNDGND 2929 SPOUTPSPOUTP A.OA.O 3030 GNDPAGNDPA GNDGND 3131 SPOUTNSPOUTN A.OA.O 3232 VCCPAVCCPA VCCVCC 3333 HSSPOUTHSSPOUT A.OA.O 3434 LOUT0LOUT0 A.OA.O 3535 DCIN0DCIN0 A.IA.I 3636 LIN0LIN0 A.IA.I 3737 VCCAVCCA VCCVCC 3838 GNDAGNDA GNDGND 3939 HSMIPHSMIP A.IA.I 4040 HSMINHSMIN A.IA.I 4141 VREFVREF A.OA.O 4242 MINMIN A.IA.I 4343 MIPMIP A.IA.I 4444 GNDRGNDR GNDGND 4545 TXMODTXMOD A.OA.O 4646 VREFRVREFR A.OA.O 4747 RSSIRSSI A.IA.I 4848 VCCRVCCR VCCVCC 4949 GNDPLLGNDPLL GNDGND 5050 VCCPLLVCCPLL VCCVCC 5151 XOUTXOUT A.OA.O 5252 XINXIN A.IA.I 5353 GNDGND GNDGND 5454 ResetReset D.ID.I NormalNormal ---- ResetReset 5555 Power DownPower Down D.ID.I NormalNormal ---- Power DownPower Down 5656 FLASH_RSTFLASH_RST **HighHigh MiddleMiddle LowLow 5757 TX_OUTTX_OUT D.OD.O HighHigh ---- LowLow 5858 PA_CONTPA_CONT D.OD.O Low PowerLow Power ---- High PowerHigh Power 5959 FLASH_SOFLASH_SO **HighHigh MiddleMiddle LowLow 6060 FLASH_SIFLASH_SI **HighHigh MiddleMiddle LowLow 6161 FLASH_CSFLASH_CS **HighHigh MiddleMiddle LowLow 6262 BMCCLKBMCCLK D.OD.O HighHigh ---- LowLow 6363 RXENRXEN D.OD.O ActiveActive ---- OffOff 6464 TXENTXEN D.OD.O ActiveActive ---- OffOff 6565 RXGAINRXGAIN D.OD.O HighHigh ---- LowLow 6666 RXIRXI D.ID.I HighHigh ---- LowLow 6767 CHG_LEDCHG_LED D.I.OD.I.O ---- OffOff OnOn 6868 INUSE_LEDINUSE_LED D.I.OD.I.O ---- OffOff OnOn 6969 ANS_LEDANS_LED D.I.OD.I.O ---- OffOff OnOn 7070 RF_RSTRF_RST D.OD.O NormalNormal ---- WakeUpWakeUp 7171 RADIO_ENRADIO_EN D.OD.O ActiveActive ---- NotNot 7272 GNDGND GNDGND ---- ---- GNDGND 7373 VCCVCC VCCVCC VCCVCC ---- ---- 7474 SHCTRLSHCTRL D.OD.O ActiveActive ---- NotNot 7575 ANT0ANT0 D.OD.O OnOn ---- OffOff 7676 TCKTCK D.OD.O ---- ---- ---- 7777 TMSTMS D.OD.O ---- ---- ---- 7878 TDITDI D.ID.I ---- ---- ---- 7979 TD0TD0 D.OD.O ---- ---- ---- 8080 SEG12SEG12 D.OD.O HighHigh ---- LowLow 8181 SEG11SEG11 D.OD.O HighHigh ----

LowLow 8282 SEG10SEG10 D.OD.O HighHigh ---- LowLow 8383 SEG9SEG9 D.OD.O HighHigh ---- LowLow 8484 SEG8SEG8 D.OD.O HighHigh ---- LowLow 8585 SEG7SEG7 D.OD.O HighHigh ---- LowLow 8686 SEG6SEG6 D.OD.O HighHigh ---- LowLow 8787 SEG5SEG5 D.OD.O HighHigh ---- LowLow 8888 SEG4SEG4 D.OD.O HighHigh ---- LowLow 8989 SEG3SEG3 D.OD.O HighHigh ---- LowLow 9090 COM2COM2 D.OD.O HighHigh MiddleMiddle LowLow 9191 COM1COM1 D.OD.O HighHigh MiddleMiddle LowLow 9292 UART_TXUART_TX D.OD.O HighHigh ---- LowLow 9393 UART_RXUART_RX D.ID.I HighHigh ---- LowLow 9494 INT0INT0 D.OD.O ---- ---- ---- 9595 MSG_LEDMSG_LED D.I.OD.I.O ---- OffOff OnOn 9696 GNDGND GNDGND ---- ---- GNDGND 9797 VCCVCC VCCVCC VCCVCC ---- ---- 9898 SP_LEDSP_LED D.I.OD.I.O ---- OffOff OnOn 9999 FLASH_CLKFLASH_CLK **HighHigh MiddleMiddle LowLow 100100 INT_1INT_1 D.OD.O HighHigh ---- LowLow

Note:

- The mark ö*“ in the I/O column means the port is controlled by the firmware.
- Data in the blank columns are omitted because of the Analog I/O.

27 CPU DATA (HANDSET) 27.1 IC201
PINPIN DescriptionDescription I/OI/O HighHigh High_ZHigh_Z LowLow
11 SPOUTPSPOUTP A.OA.O 22 BCLKBCLK A.OA.O 33 NCNC A.OA.O 44 RSSIRSSI A.IA.I
55 XINXIN A.IA.I 66 XOUTXOUT A.OA.O 77 VDDVDD VDDVDD ---- ---- VDDVDD 88
VCCVCC VCCVCC VCCVCC ---- ---- 99 GNDGND GNDGND ---- ---- GNDGND 1010
USBPUSBP I/OI/O HighHigh ---- LowLow 1111 USBMUSBM I/OI/O HighHigh ---- LowLow
1212 VCCVCC VCCVCC VCCVCC ---- ---- 1313 DCDCGNDDCDCGND A.OA.O 1414
LED_CTRLLED_CTRL A.OA.O ---- OffOff OnOn 1515 NCNC A.OA.O 1616 RSTNRSTN
D.ID.I NormalNormal ---- ResetReset 1717 FLASH_RESETFLASH_RESET D.OD.O
HighHigh ---- LowLow 1818 FLASH_DOFLASH_DO D.OD.O HighHigh ---- LowLow 1919
FLASH_DIFLASH_DI D.ID.I HighHigh ---- LowLow 2020 FLASH_CSFLASH_CS D.OD.O
HighHigh ---- LowLow 2121 NCNC D.OD.O ---- ---- LowLow 2222 SERIAL_DISERIAL_DI
D.ID.I HighHigh ---- LowLow 2323 TXOUTTXOUT D.OD.O HighHigh ---- LowLow 2424
PA_CTRLPA_CTRL D.OD.O HighHigh ---- LowLow 2525 SYN_LE2SYN_LE2 D.OD.O OnOn
---- OffOff 2626 CON_ENCON_EN D.OD.O HighHigh ---- LowLow 2727
RF_RESETRF_RESET D.OD.O NormalNormal ---- ResetReset 2828 LCD D/CLCD D/C
D.OD.O HighHigh ---- LowLow 2929 SHCTRLSHCTRL D.OD.O OnOn ---- OffOff 3030
GNDGND GNDGND ---- ---- GNDGND 3131 VCCVCC VCCVCC VCCVCC ---- ---- 3232
SERIAL_LESERIAL_LE D.OD.O HighHigh ---- LowLow 3333 SERIAL_CLKSERIAL_CLK
D.OD.O HighHigh ---- LowLow 3434 SERIAL_DATASERIAL_DATA D.OD.O HighHigh ----
LowLow 3535 RXENRXEN D.OD.O ActiveActive ---- OffOff 3636 TXENTXEN D.OD.O
ActiveActive ---- OffOff 3737 RXGAINRXGAIN D.OD.O HighHigh ---- LowLow 3838 RXIRXI
D.ID.I HighHigh ---- LowLow 3939 NCNC D.OD.O ---- ---- LowLow 4040 NCNC D.ID.I ---- ----
LowLow 4141 CHG_DETCHG_DET D.ID.I Off ChargeOff Charge ---- On ChargeOn Charge
4242 LCD_DB0LCD_DB0 D.OD.O HighHigh ---- LowLow 4343 LCD_DB1LCD_DB1 D.OD.O
HighHigh ---- LowLow 4444 LCD_DB2LCD_DB2 D.OD.O HighHigh ---- LowLow 4545
LCD_DB3LCD_DB3 D.OD.O HighHigh ---- LowLow 4646 LCD_DB4LCD_DB4 D.OD.O
HighHigh ---- LowLow 4747 LCD_DB5LCD_DB5 D.OD.O HighHigh ---- LowLow 4848
LCD_DB6LCD_DB6 D.OD.O HighHigh ---- LowLow 4949 LCD_DB7LCD_DB7 D.OD.O
HighHigh ---- LowLow 5050 GNDGND GNDGND ---- ---- GNDGND 5151 VCCVCC VCCVCC
VCCVCC ---- ---- 5252 LCD_RESETLCD_RESET D.OD.O NormalNormal ---- ResetReset
5353 FLASH_CLKFLASH_CLK D.OD.O ---- ---- ---- 5454 ANT_LED1ANT_LED1 D.OD.O
OnOn ---- OffOff 5555 ANT_LED2ANT_LED2 D.OD.O OnOn ---- OffOff 5656
ANT_LED3ANT_LED3 D.OD.O OnOn ---- OffOff 5757 LCD_BLLCD_BL D.OD.O OnOn ----
OffOff 5858 LCD_CSLCD_CS D.OD.O HighHigh ---- LowLow 5959 LCD_WRLCD_WR
D.OD.O HighHigh ---- LowLow 6060 LCD_RDLCD_RD D.OD.O HighHigh ---- LowLow 6161
LCD_PWR _CTRLLCD_PWR _CTRL D.OD.O HighHigh ---- LowLow 6262 STB_ESTB_E
D.OD.O ---- NotNot ActiveActive 6363 STB_DSTB_D D.OD.O ---- NotNot ActiveActive 6464
STB_CSTB_C D.OD.O ---- NotNot ActiveActive 6565 STB_BSTB_B D.OD.O ---- NotNot
ActiveActive 6666 STB_ASTB_A D.OD.O ---- NotNot ActiveActive 6767 GNDGND GNDGND -
--- ---- GNDGND 6868 VCCVCC VCCVCC VCCVCC ---- ---- 6969 TCKTCK D.ID.I ---- ---- ----
7070 TMSTMS D.ID.I ---- ---- ---- 7171 TDITDI D.ID.I ---- ---- ---- 7272 TDOTDO D.OD.O ---- --
-- ---- 7373 KIN_1KIN_1 D.ID.I NonNon ---- Key InKey In 7474 KIN_2KIN_2 D.ID.I NonNon ----
Key InKey In 7575 KIN_3KIN_3 D.ID.I NonNon ---- Key InKey In 7676 KIN_4KIN_4 D.ID.I
NonNon ---- Key InKey In 7777 KIN_5KIN_5 D.ID.I NonNon ---- Key InKey In 7878
LED_CTRLLED_CTRL D.OD.O OnOn ---- OffOff 7979 CHG_CTRLCHG_CTRL D.OD.O

TrickleTrickle ---- NormalNormal 8080 EEP_SCLEEP_SCL D.OD.O HighHigh ---- LowLow 8181 EEP_SDAEEP_SDA D.I.OD.I.O HighHigh ---- LowLow 8282 UART_TXUART_TX D.OD.O HighHigh ---- LowLow 8383 UART_RXUART_RX D.ID.I HighHigh ---- LowLow 8484 EEP_WPEEP_WP D.OD.O WPWP ---- WriteWrite 8585 GNDGND GNDGND ---- ---- GNDGND 8686 PDNPDN A.IA.I 8787 IBATIBAT A.IA.I 8888 VREFVREF A.OA.O 8989 MIPMIP A.OA.O 9090 MINMIN A.OA.O 9191 MPWRMPWR A.I.OA.I.O 9292 GNDAGNDA GND AGND A ---- ---- GNDAGNDA 9393 VCCAVCCA VCC AVCC A VCCAVCCA ---- ---- 9494 HEADSET_MINHEADSET_MIN A.IA.I 9595 HEADSET_DETHEADSET_DET A.IA.I 9696 HSSPOUTNHSSPOUTN A.OA.O 9797 HSSPOUTPHSSPOUTP A.OA.O 9898 VCCPAVCCPA VCC PAVCC PA VCCPAVCCPA ---- ---- 9999 SPOUTNSPOUTN A.OA.O 100100 GNDPAGNDPA GND PAGND PA ---- ---- GNDPAGNDPA

Note:

- Data in the blank columns are omitted because of the Analog I/O.

28 EXPLANATION OF IC TERMINALS (RF PART) 28.1 IC701 28.2 IC801 28.3 IC851

29 HOW TO REPLACE THE FLAT PACKAGE IC

Even if you do not have the special tools (for example, a spot heater) to remove the Flat IC, with some solder (large amount), a soldering iron and a cutter knife, you can easily remove the ICs that have more than 100 pins.

29.1 PREPARATION

- PbF (: Pb free) Solder
- Soldering Iron

  Tip Temperature of 700°F ± 20°F (370°C ± 10°C)

  Note: We recommend a 30 to 40 Watt soldering iron. An expert may be able to use a 60 to 80 Watt iron where someone with less experience could overheat and damage the PCB foil.

- Flux

  Recommended Flux: Specific Gravity → 0.82.

  Type → RMA (lower residue, non-cleaning type)

Note: See ABOUT LEAD FREE SOLDER (PbF: Pb free) ( )

29.2 FLAT PACKAGE IC REMOVAL PROCEDURE

1. Put plenty of solder on the IC pins so that the pins can be completely covered.

   Note:

   If the IC pins are not soldered enough, you may give pressure to the P.C. board when cutting the pins with a cutter.

2. Make a few cuts into the joint (between the IC and its pins) first and then cut off the pins thoroughly.

3. While the solder melts, remove it together with the IC pins.

When you attach a new IC to the board, remove all solder left on the land with some tools like a soldering wire. If some solder is left at the joint on the board, the new IC will not be attached properly.

29.3 FLAT PACKAGE IC INSTALLATION PROCEDURE

1. Temporarily fix the FLAT PACKAGE IC, soldering the two marked pins.
2. Apply flux to all pins of the FLAT PACKAGE IC.
3. Solder the pins, sliding the soldering iron in the direction of the arrow.

29.4 BRIDGE MODIFICATION PROCEDURE

1. Lightly resolder the bridged portion.
2. Remove the remaining solder along the pins using a soldering iron as shown in the figure below.

30 CABINET AND ELECTRICAL PARTS (BASE UNIT)

31 CABINET AND ELECTRICAL PARTS (HANDSET)

32 CABINET AND ELECTRICAL PARTS (CHARGER UNIT)

33 ACCESSORIES AND PACKING MATERIALS 33.1 KX-TGA551M (Optional Set) 33.2 KX-TG5583M Note:

KX-TG5583M is sold in the Blister Pack and the Blister Pack is not supplied as a service part.

34 TERMINAL GUIDE OF THE ICs, TRANSISTORS AND DIODES 34.1 Base Unit 34.2 Handset 34.3 Charger Unit

35 REPLACEMENT PARTS LIST

Note:

1. RTL (Retention Time Limited)

   The marking (RTL) indicates that the Retention Time is limited for this item.

   After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability depends on the type of assembly and the laws governing parts and product retention.

   At the end of this period, the assembly will no longer be available.

2. Important safety notice

   Components identified by the mark indicates special characteristics important for safety. When replacing any of these components, only use specified manufacture•s parts.

3. The S mark means the part is one of some identical parts. For that reason, it may be different from the installed part.

4. ISO code (Example: ABS-94HB) of the remarks column shows quality of the material and a flame resisting grade about plastics.

5. RESISTORS & CAPACITORS

   Unless otherwise specified;

   All resistors are in ohms (Ω) K=1000Ω, M=1000kΩ

   All capacitors are in MICRO FARADS (μF) P=μμF

   *Type & Wattage of Resistor

35.1 Base Unit 35.1.1 Cabinet and Electrical Parts
35.1.2 Main P.C. Board Parts Note:

(*1) When you have replaced IC501 or IC601, adjust X501.

Refer to Check and Adjust X501 (Base Unit) Frequency ( ).

35.1.3 Operational P.C. Board Parts
35.2 Handset 35.2.1 Cabinet and Electrical Parts
35.2.2 Main P.C.Board Parts Note:

(*1) When you have replaced IC201 or IC241, adjust X201.

Refer to Check and Adjust X201 (Handset) Frequency ( ) and Adjust Battery Low Detector Voltage (Handset) ( ).

35.3 Charger Unit 35.3.1 Cabinet and Electrical Parts
35.3.2 Main P.C.Board Parts
35.4 Accessories and Packing Materials 35.4.1 KX-TGA551M (Optional Set)
35.4.2 KX-TG5583M Note:

KX-TG5583M is sold in the Blister Pack and the Blister Pack is not supplied as a service part.

Memo

36 FOR SCHEMATIC DIAGRAM 36.1 Base Unit (SCHEMATIC DIAGRAM (BASE UNIT_MAIN)) 36.1.1 Acoustic Testing Mode Notes:

1. DC voltage measurements are taken with voltmeter from the negative voltage line.

2. This schematic diagram may be modified at any time with the development of new technology.

36.2 Handset (SCHEMATIC DIAGRAM (HANDSET_MAIN)) Notes:

1. DC voltage measurements are taken with an oscilloscope or a tester with a ground.

2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.

36.3 Charger Unit (SCHEMATIC DIAGRAM (CHARGER UNIT)) Notes:

1. DC voltage measurements are taken with voltmeter from the negative voltage line.

2. This schematic diagram may be modified at any time with the development of new technology.

37 SCHEMATIC DIAGRAM (BASE UNIT_MAIN)

38 SCHEMATIC DIAGRAM (BASE UNIT_RF PART)

39 SCHEMATIC DIAGRAM (BASE UNIT_OPERATION) Memo

40 SCHEMATIC DIAGRAM (HANDSET_MAIN)

41 SCHEMATIC DIAGRAM (HANDSET_RF PART)

42 SCHEMATIC DIAGRAM (CHARGER UNIT)

43 CIRCUIT BOARD (BASE UNIT_MAIN) 43.1 Component View 43.2 Flow Solder Side View

44 CIRCUIT BOARD (BASE UNIT_OPERATION) 44.1 Component View 44.2 Flow Solder Side View

45 CIRCUIT BOARD (BASE UNIT_RF PART) Memo

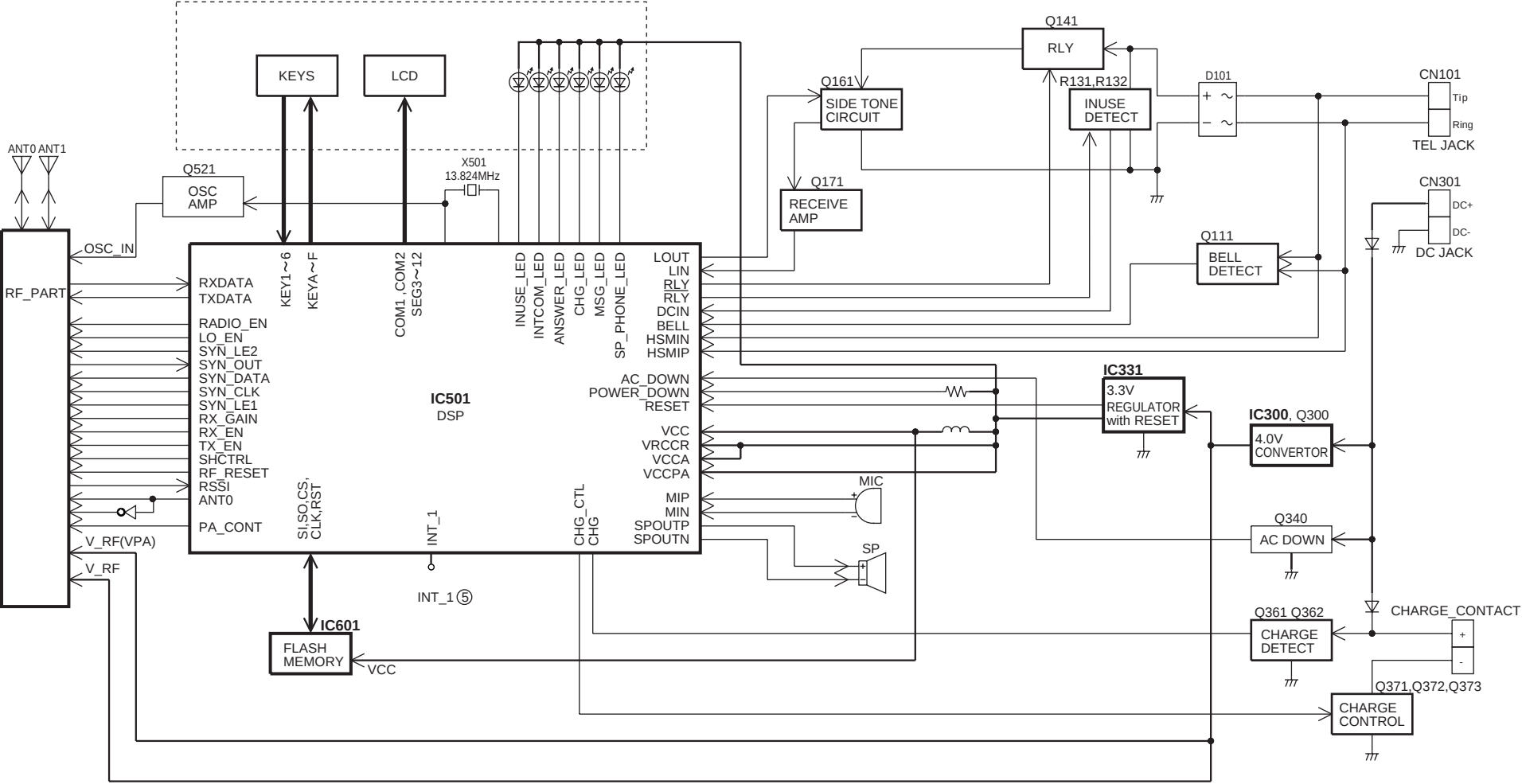
46 CIRCUIT BOARD (HANDSET_MAIN) 46.1 Component View 46.2 Flow Solder Side View

47 CIRCUIT BOARD (HANDSET_RF PART)

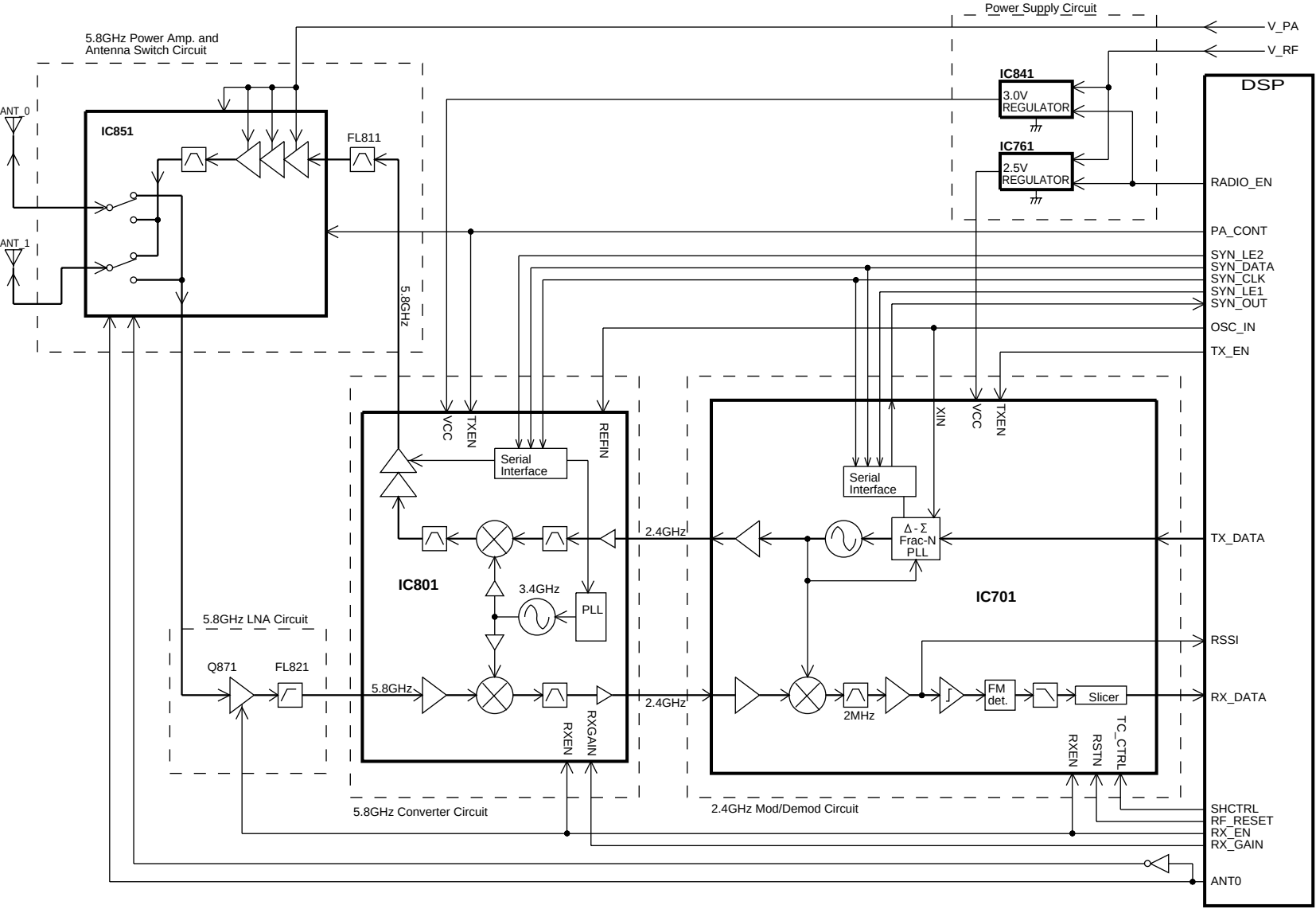
48 CIRCUIT BOARD (CHARGER UNIT) 48.1 Component View 48.2 Flow Solder Side View A.I./N

KXTG5583M

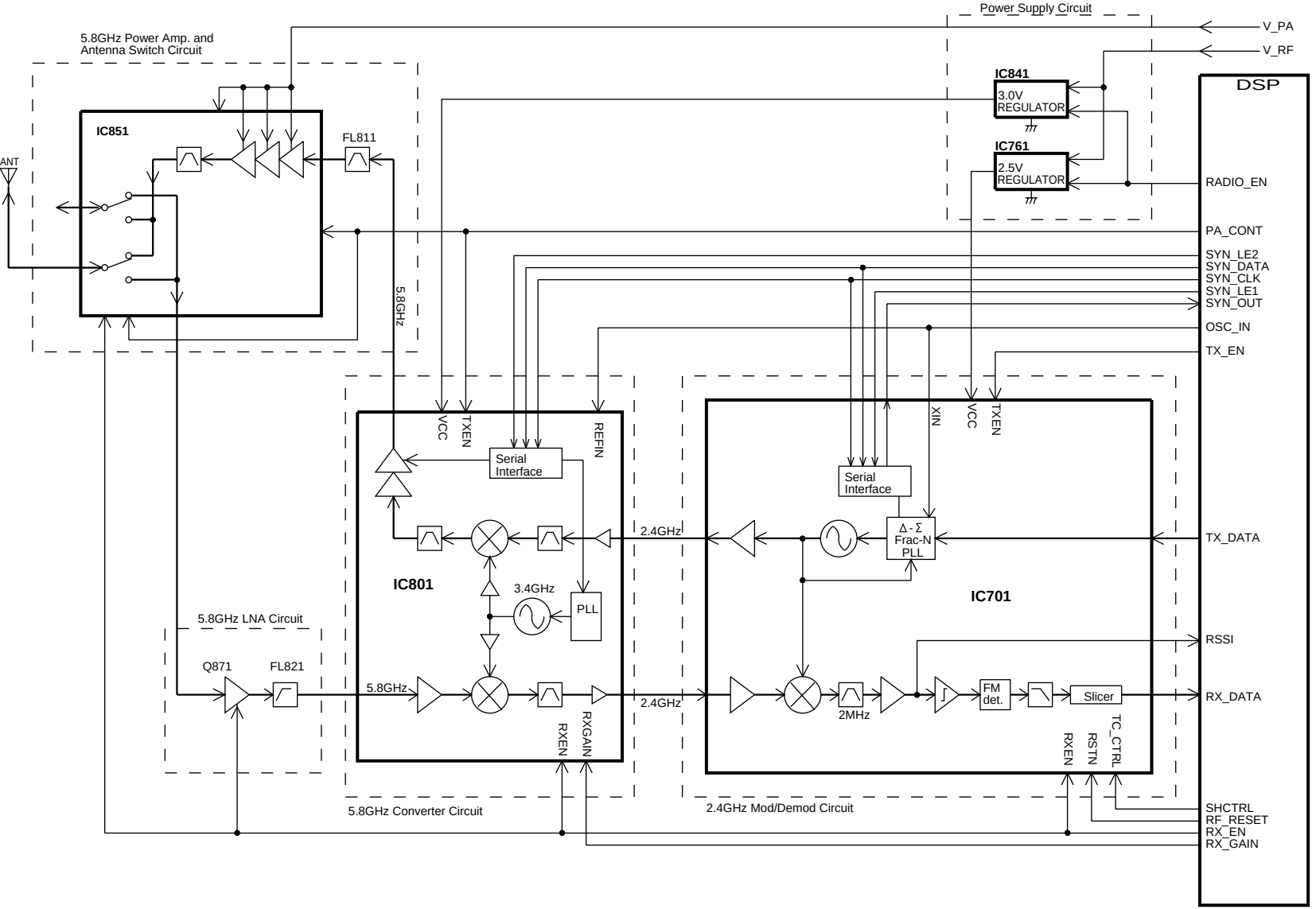
KXTGA551M



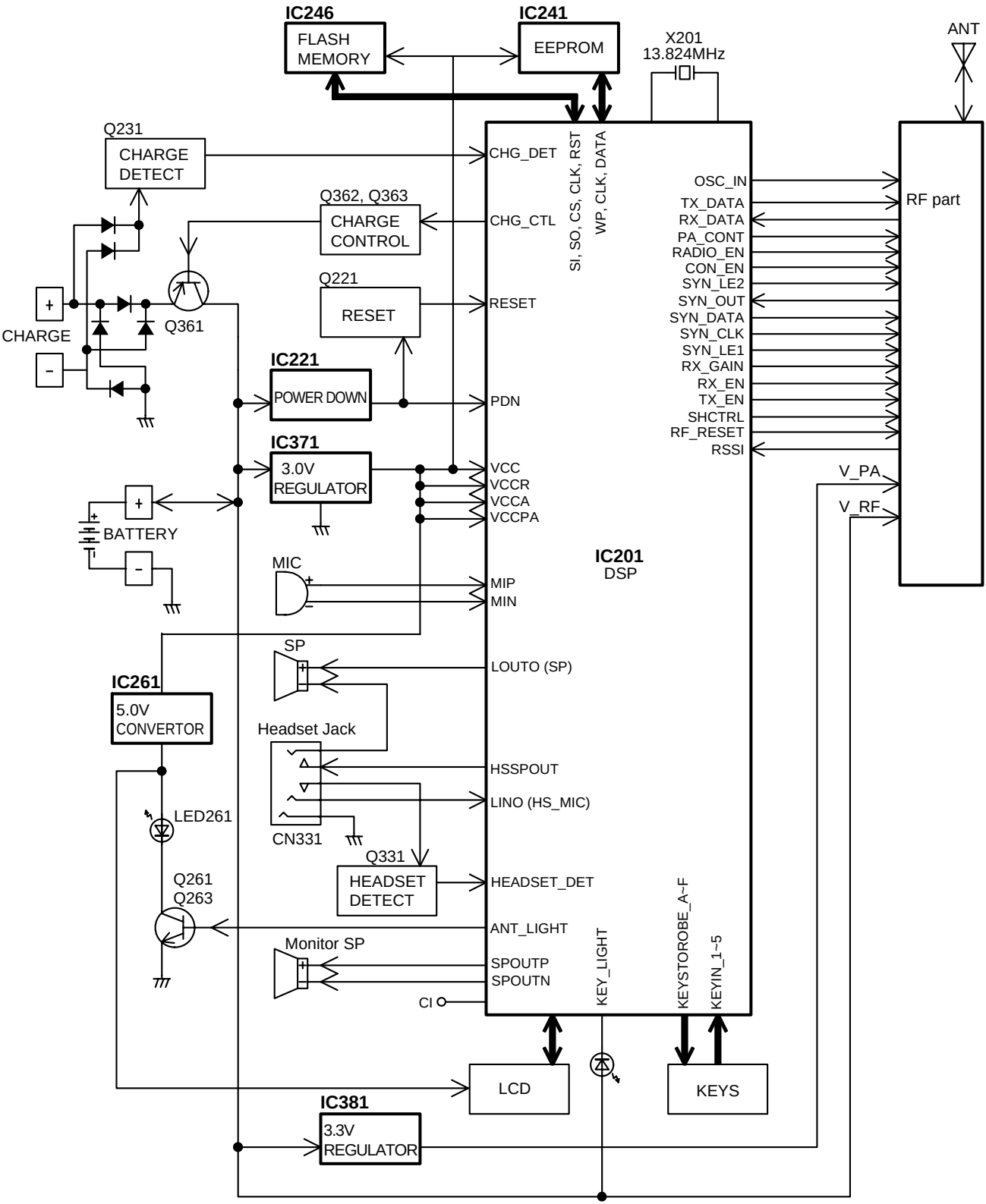
KX-TG5583 BLOCK DIAGRAM (Base Unit_Main)



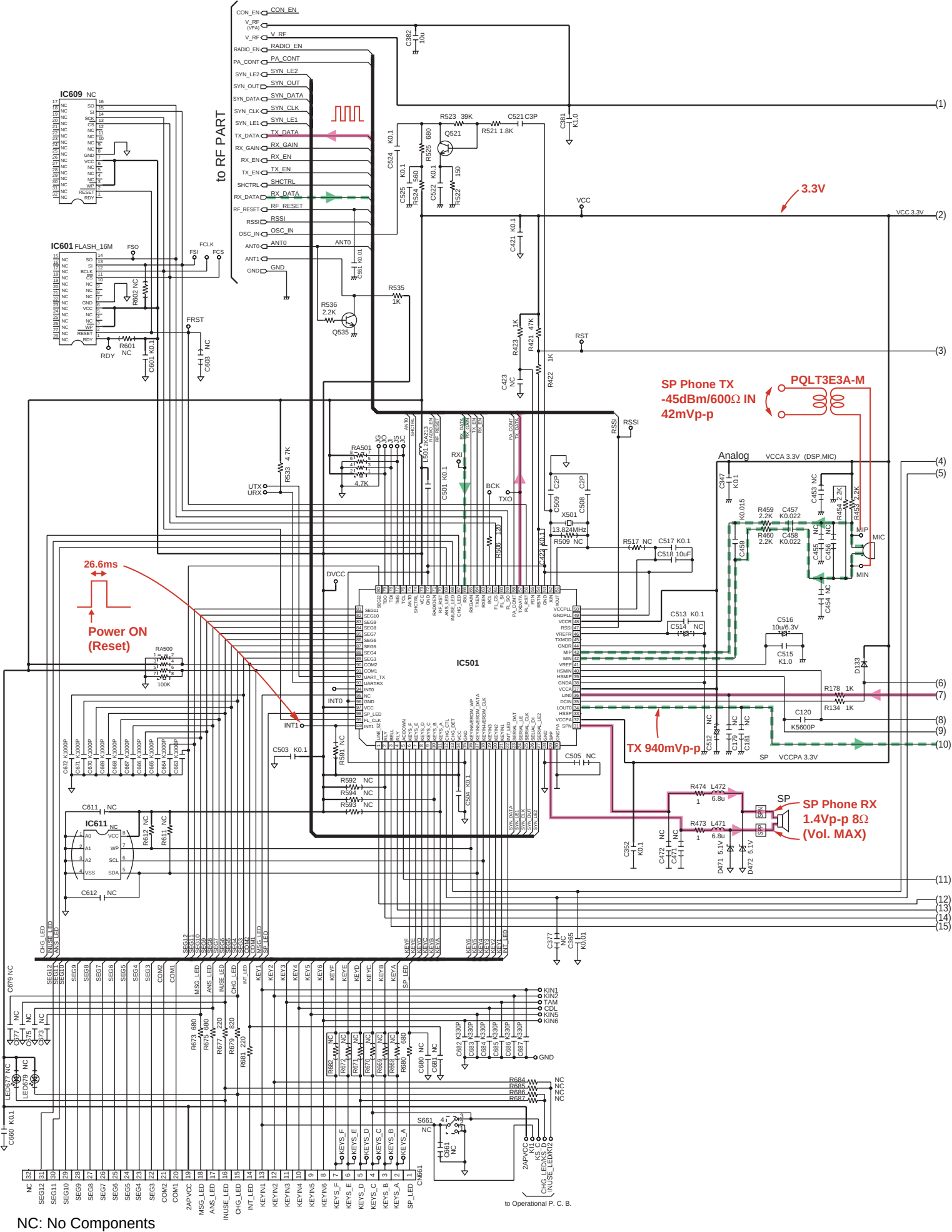
KX-TG5583 BLOCK DIAGRAM (Base Unit_RF Part)

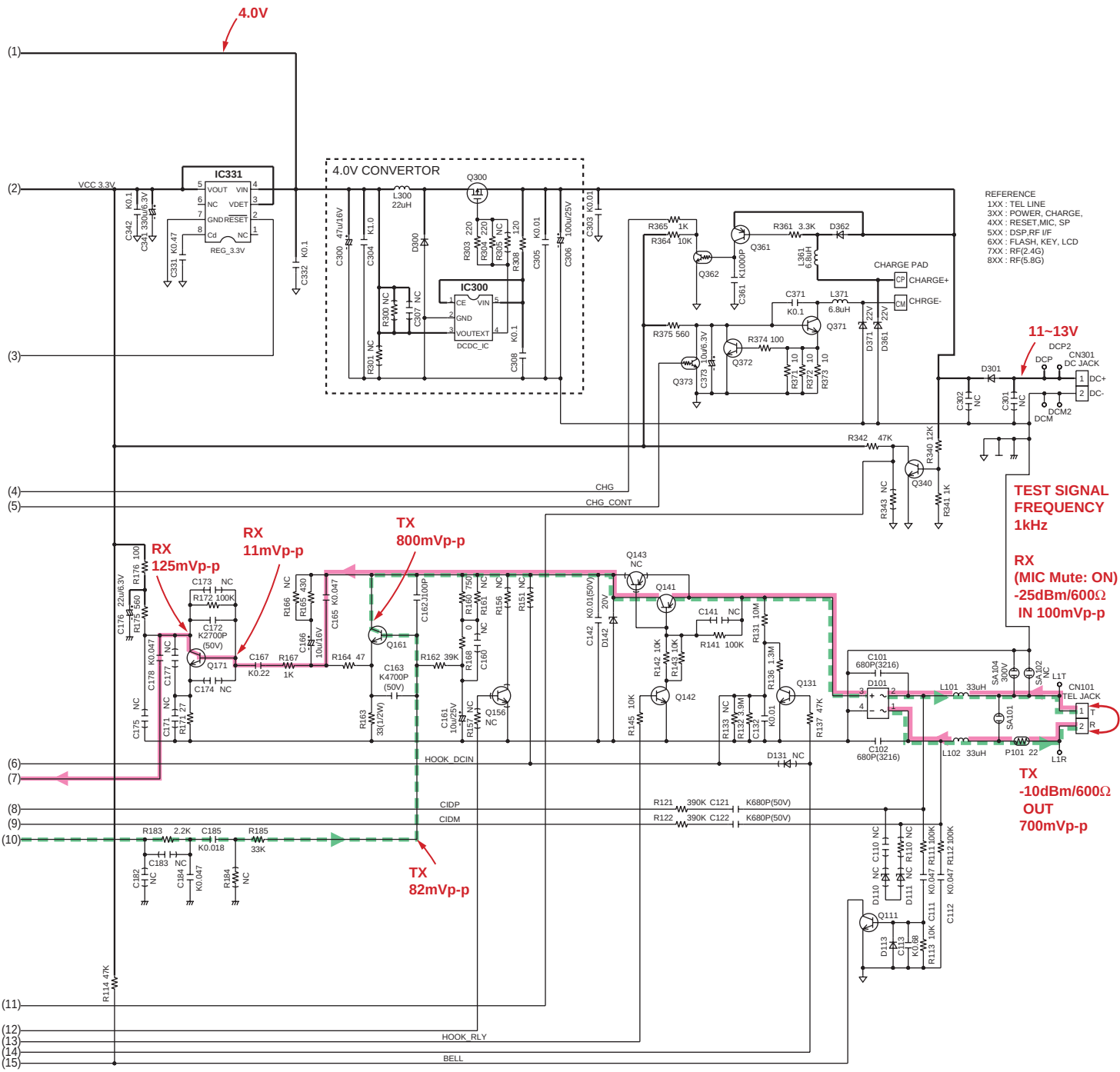


KX-TGA551 BLOCK DIAGRAM (Handset_RF Part)



KX-TGA551 BLOCK DIAGRAM (Handset)


IC609 NC
IC601 FLASH_16M
to RF PART
CON_EN
V_RF (VPA)
V_RF
RADIO_EN
PA_CONT
SYN_LE2
SYN_OUT
SYN_DATA
SYN_CLK
SYN_LE1
TX_DATA
RX_GAIN
RX_EN
TX_EN
SHCTRL
RX_DATA
RF_RESET
RSSI
OSC_IN
ANT0
ANT1
GND
3.3V
VCC
VCC 3.3V
RST
FRST
FSO
FSI
FCLK
FCS
RDY
UTX
URX
BCK
TXO
RXI
RSSI
SP Phone TX
-45dBm/600Ω IN
42mVp-p
PQLT3E3A-M
Analog
VCCA 3.3V (DSP,MIC)
MIP
MIN
MIC
26.6ms
Power ON
(Reset)
IC501
INT0
INT1
TX 940mVp-p
SP
VCCPA 3.3V
SP Phone RX
1.4Vp-p 8Ω
(Vol. MAX)
IC611
KIN1
KIN2
TAM
CDL
KIN5
KIN6
GND
2APVCC
to Operational P. C. B.
NC: No Components



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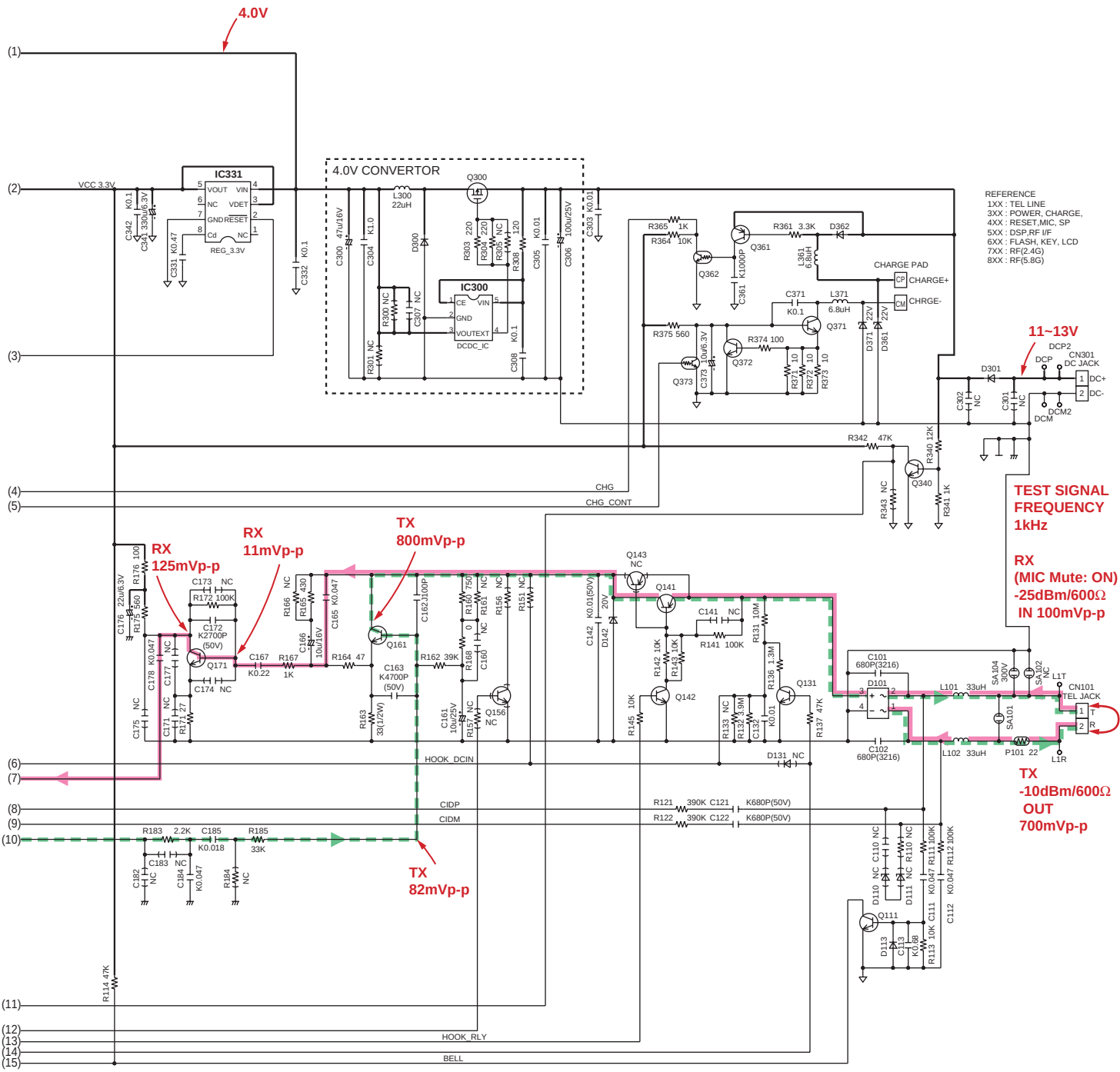

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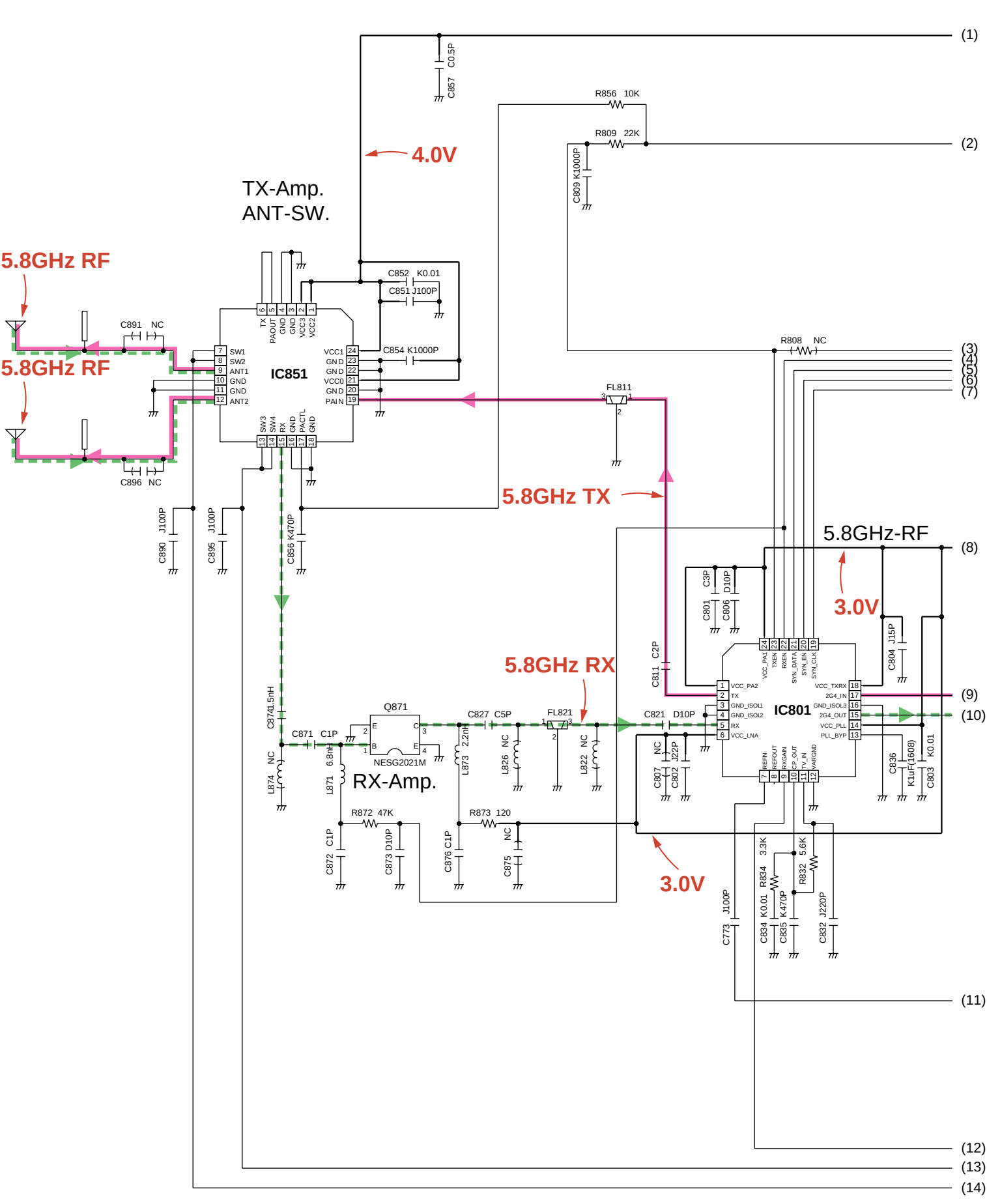
(1)
(2)
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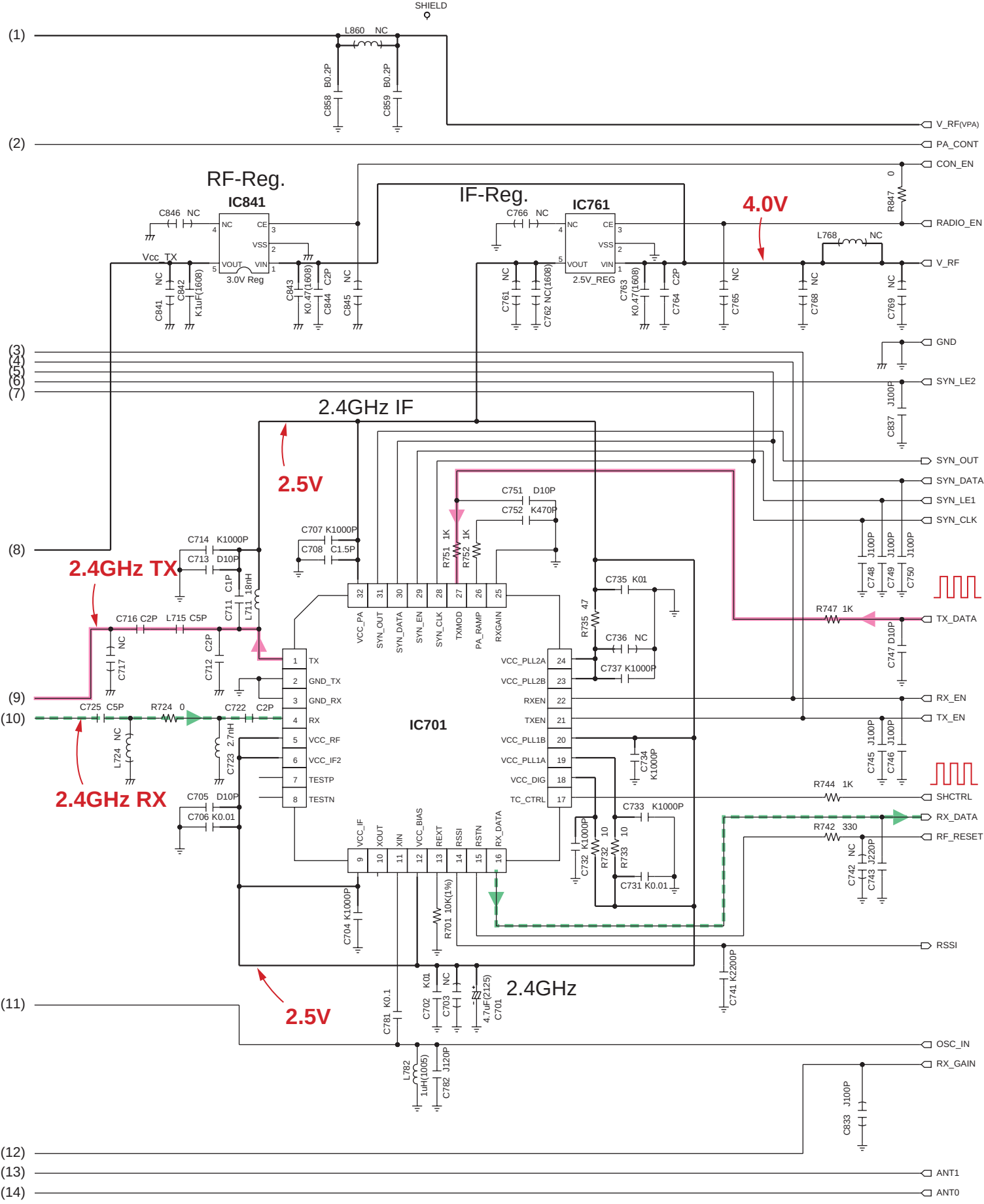
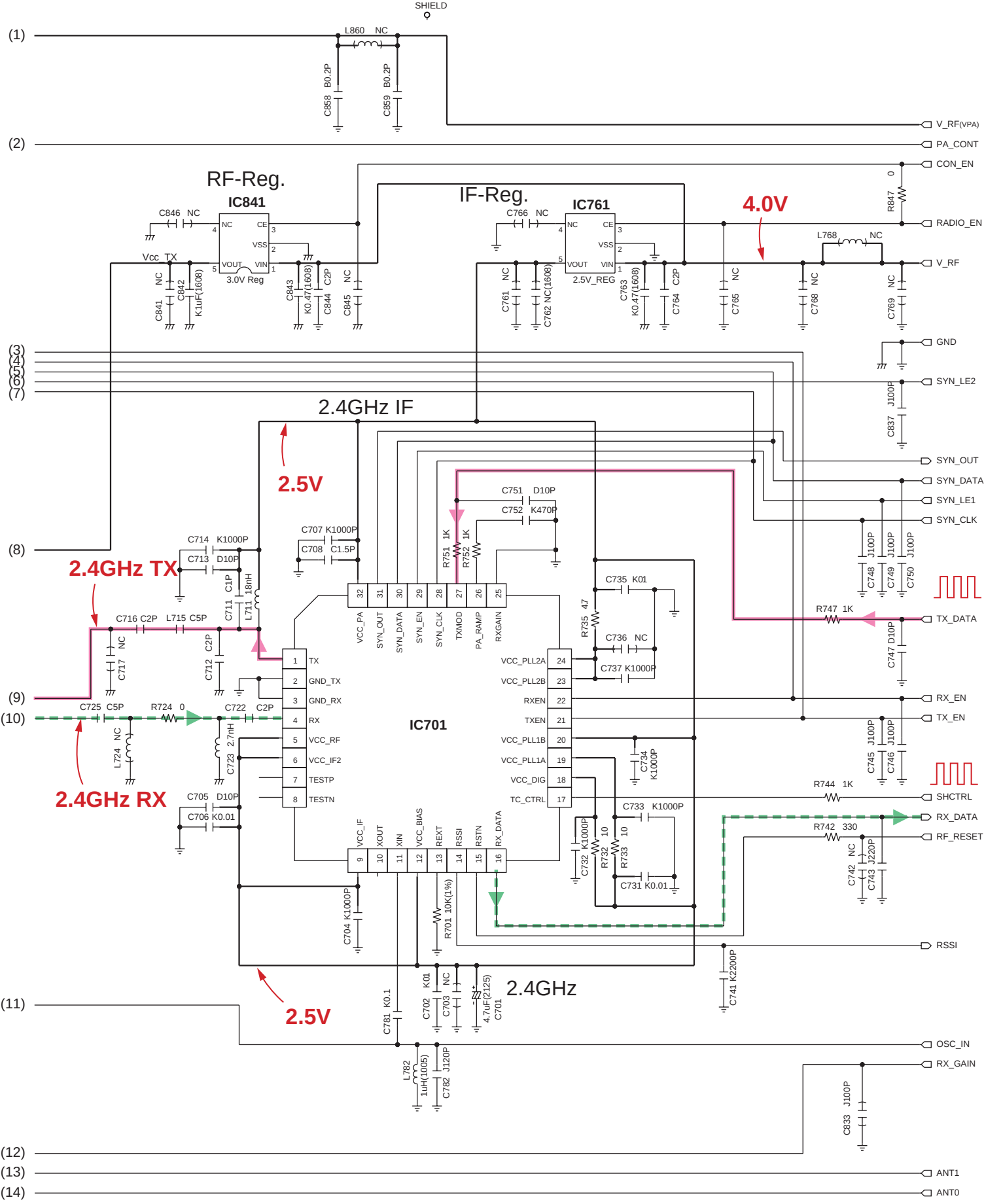
(13)
(14)
C857 C0.5P
R856 10K
R809 22K
C809 K1000P
4.0V
TX-Amp.
ANT-SW.
5.8GHz RF
5.8GHz RF
C852 K0.01
C851 J100P
C854 K1000P
C891 NC
C896 NC
IC851
SW1
SW2
ANT1
GND
GND
ANT2
VCC1
GND
GND
VCC0
GND
PAIN
TX
PAOUT
GND
GND
VCC3
VCC2
SW3
SW4
RX
GND
PACTL
GND
R808 NC
FL811
5.8GHz TX
C890 J100P
C895 J100P
C856 K470P
5.8GHz-RF
3.0V
C3P
D10P
C801
C806
C804 J15P
C811 C2P
5.8GHz RX
IC801
VCC_PA2
TX
GND_ISOL1
GND_ISOL2
RX
VCC_LNA
VCC_TXRX
2G4_IN
GND_ISOL3
2G4_OUT
VCC_PLL
PLL_BYP
C8741.5nH
Q871
NESG2021M
C871 C1P
C827 C5P
FL821
C821 D10P
C807 NC
C802 J22P
C836
K1uF(1608)
C803 K0.01
L874 NC
L871 6.8nH
L873 2.2nH
L826 NC
L822 NC
RX-Amp.
R872 47K
R873 120
C872 C1P
C873 D10P
C876 C1P
C875 NC
3.0V
C773 J100P
R834 3.3K
R832 5.6K
C834 K0.01
C835 K470P
C832 J220P
NC: No Components



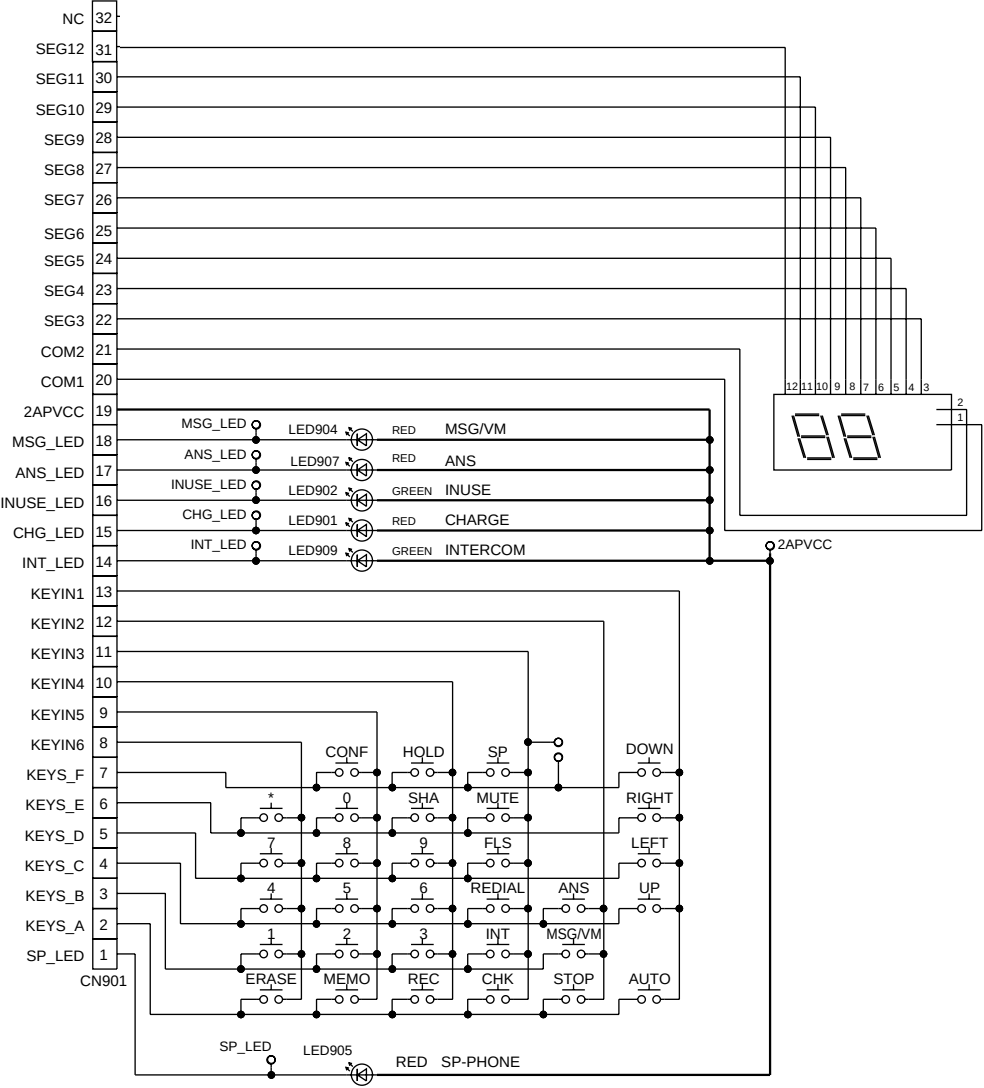
NC: No Components

KX-TG5583 SCHEMATIC DIAGRAM (Base Unit_RF Part)



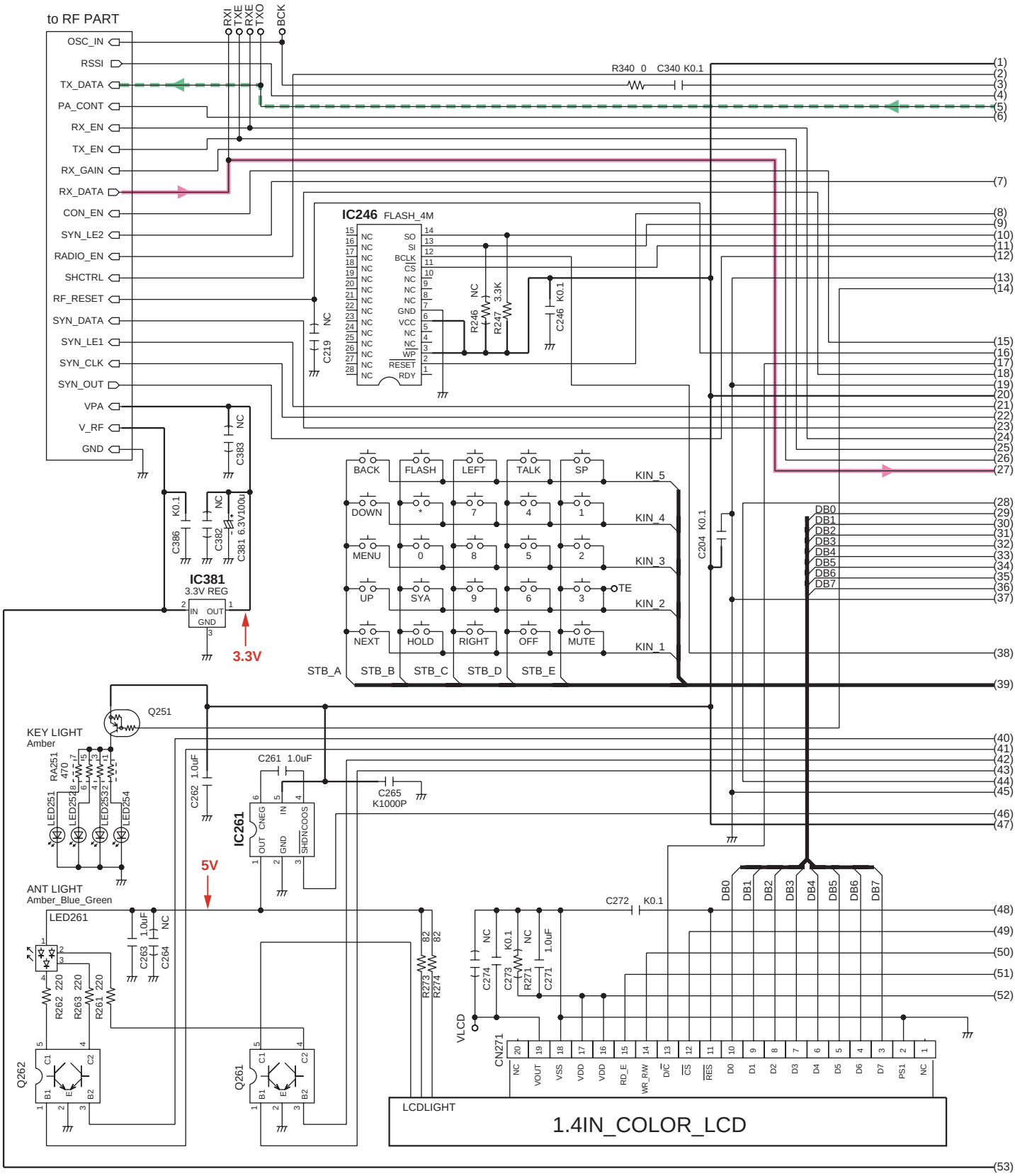
NC: No Components

KX-TG5583 SCHEMATIC DIAGRAM (Base Unit_RF Part)

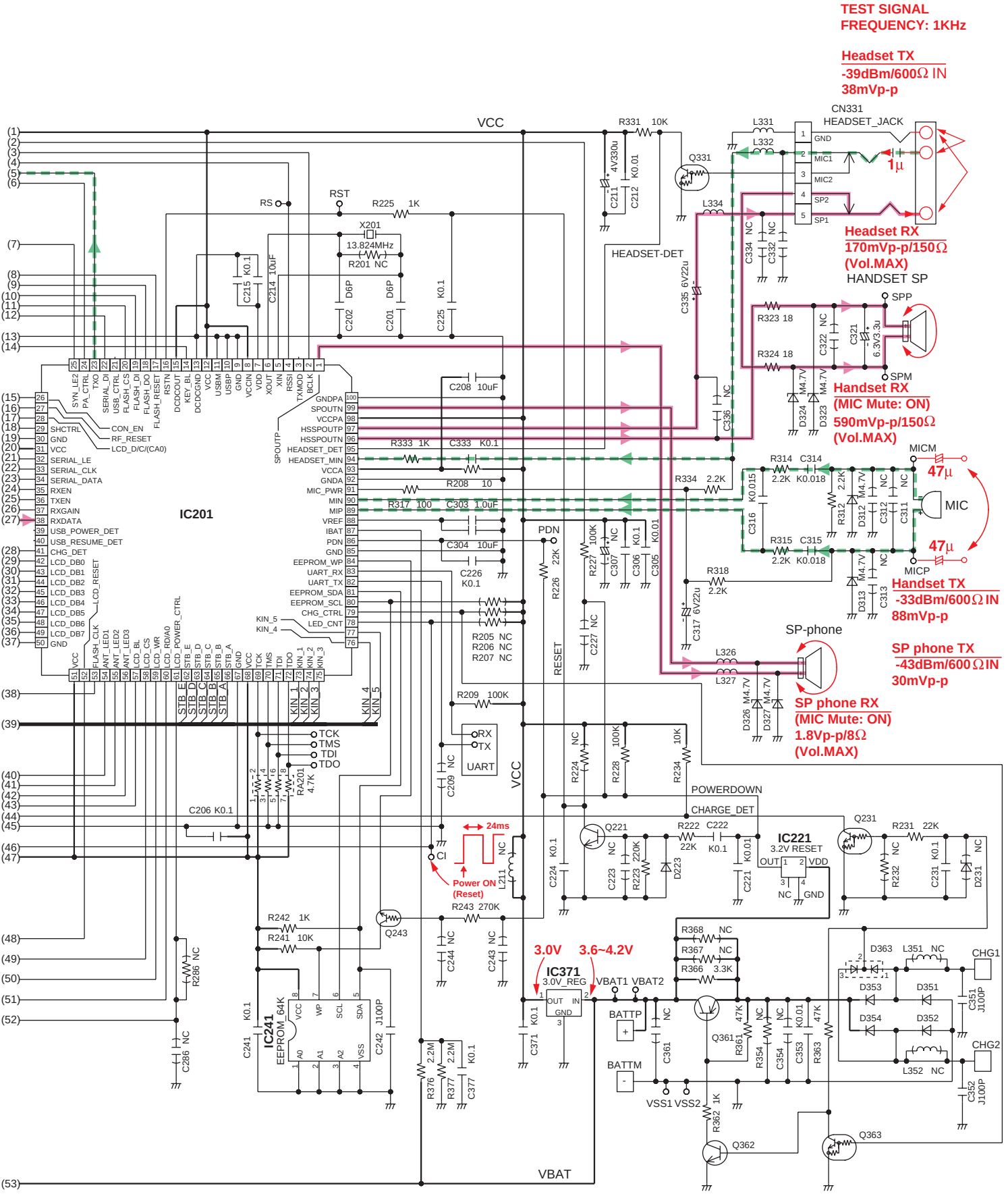


NC: No Components

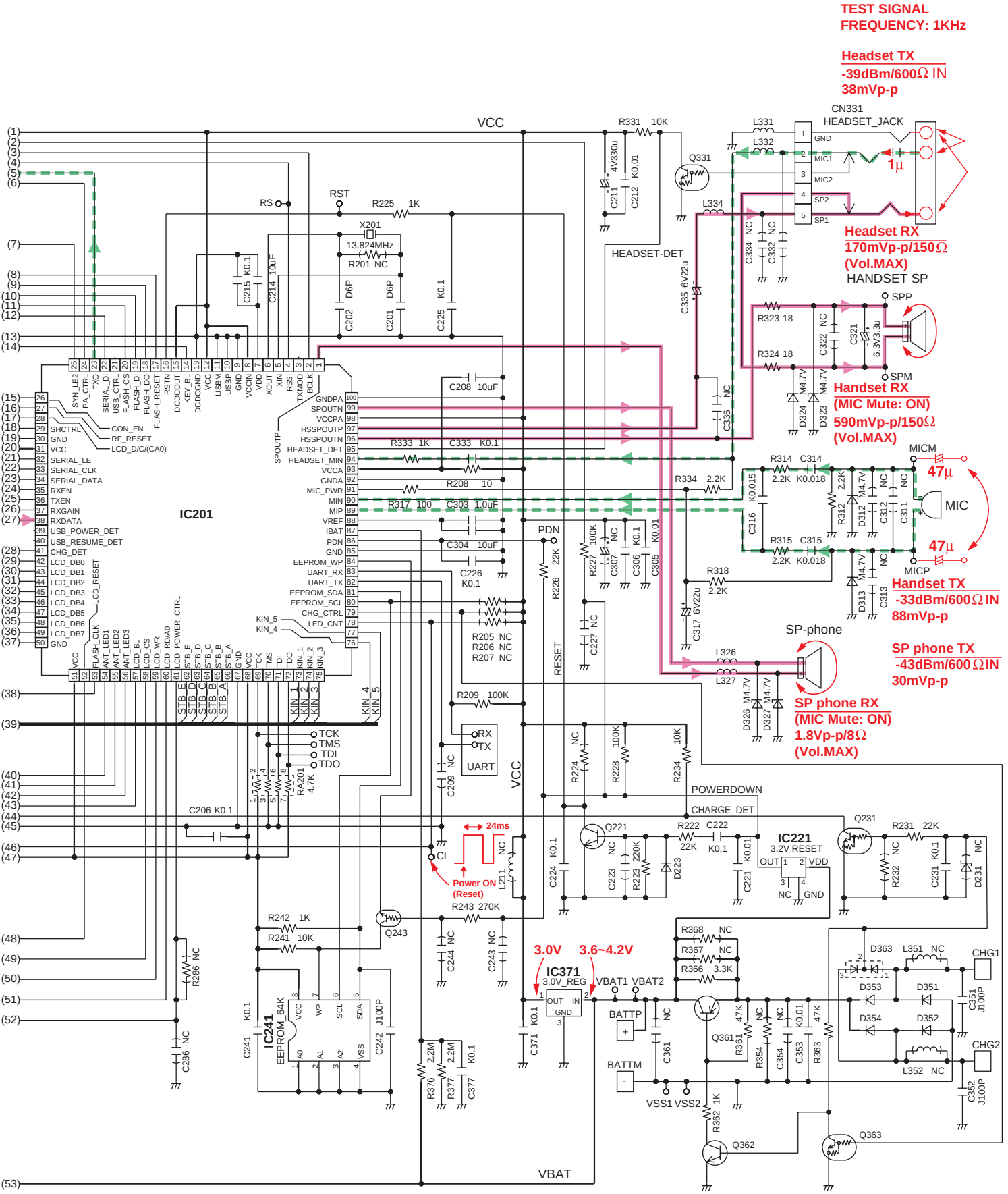
KX-TG5583 SCHEMATIC DIAGRAM (Base Unit_Operation)



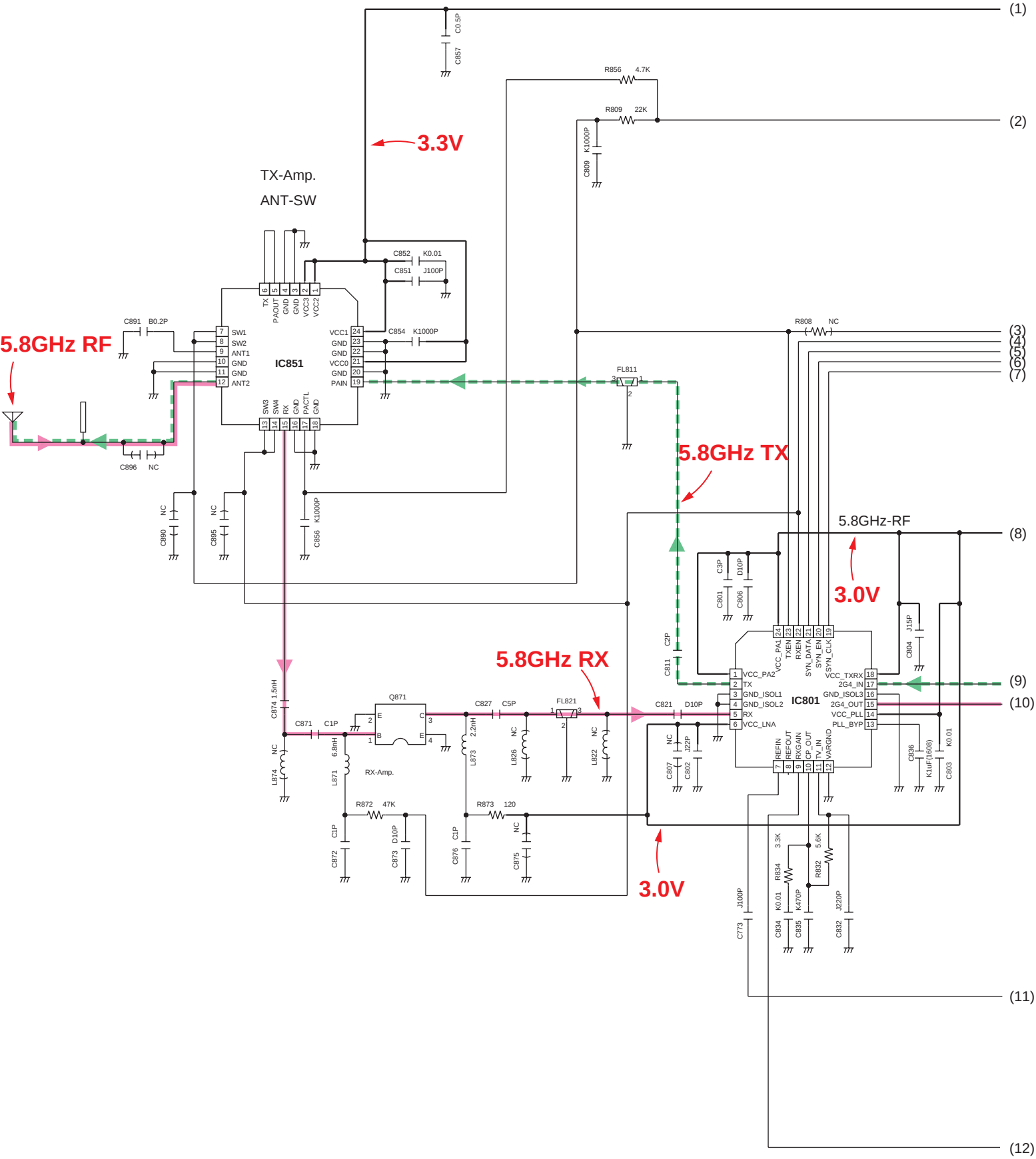
NC: No Components



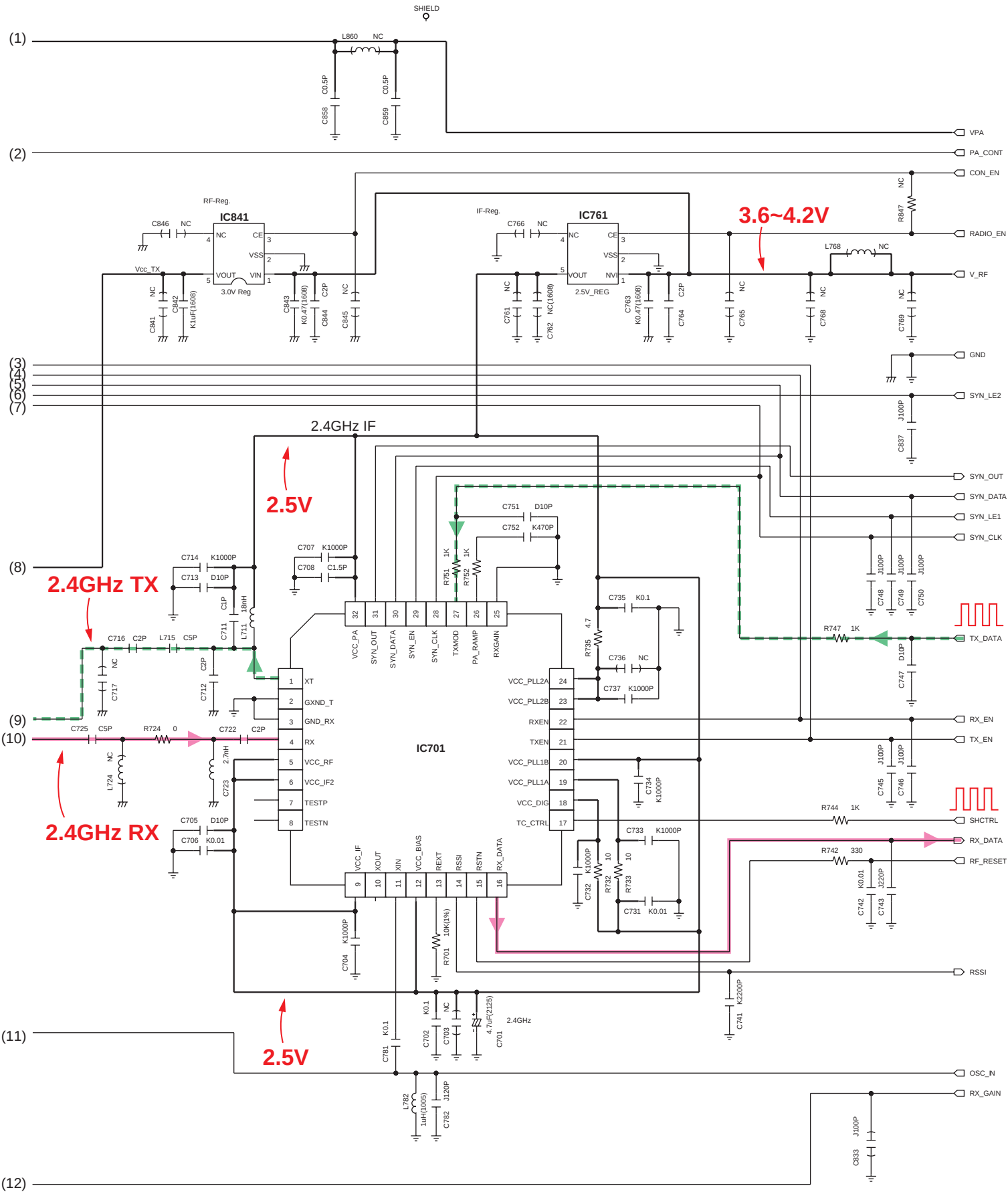
KX-TGA551 SCHEMATIC DIAGRAM (Handset_Main)



KX-TGA551 SCHEMATIC DIAGRAM (Handset_Main)

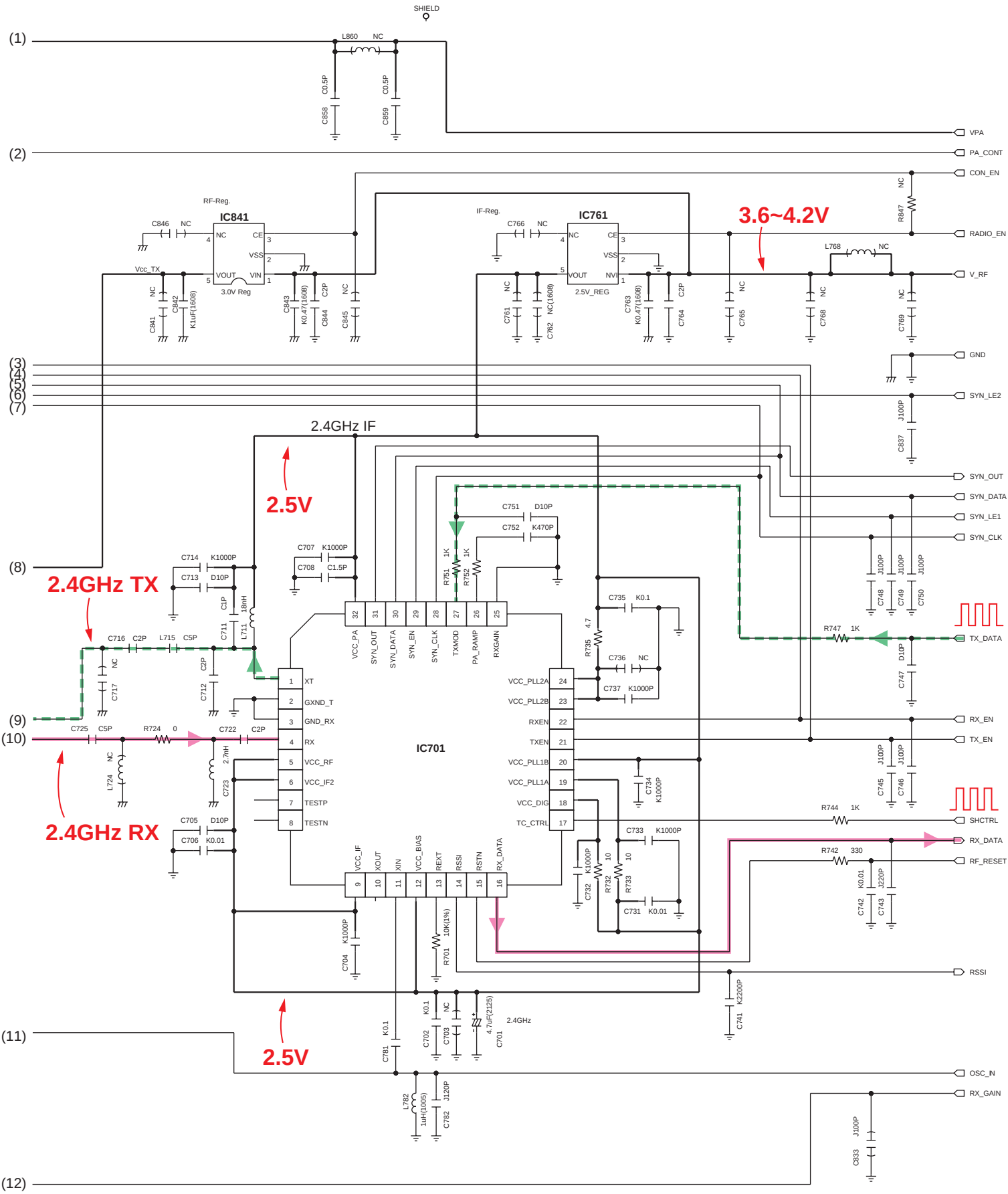


NC: No Components



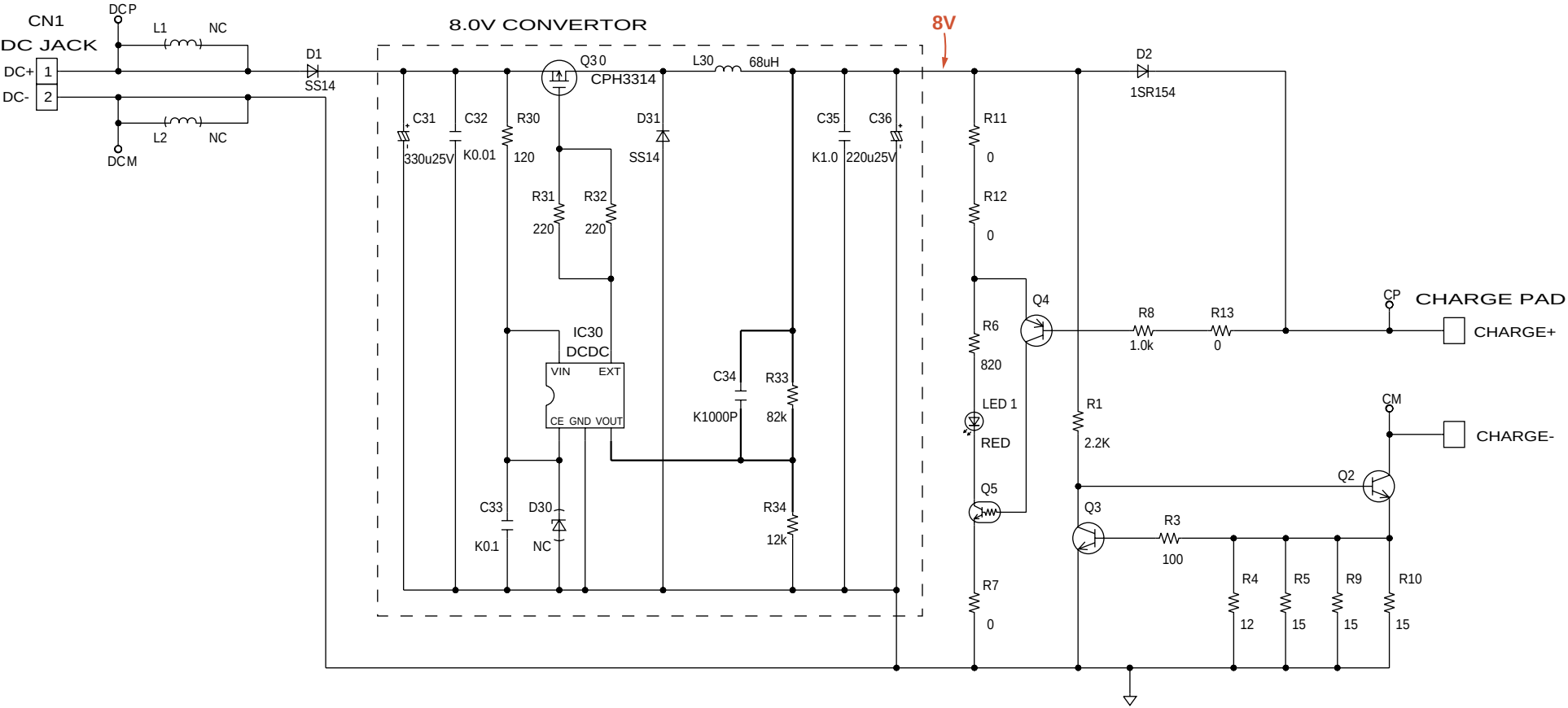
NC: No Components

KX-TGA551 SCHEMATIC DIAGRAM (Handset_RF Part)



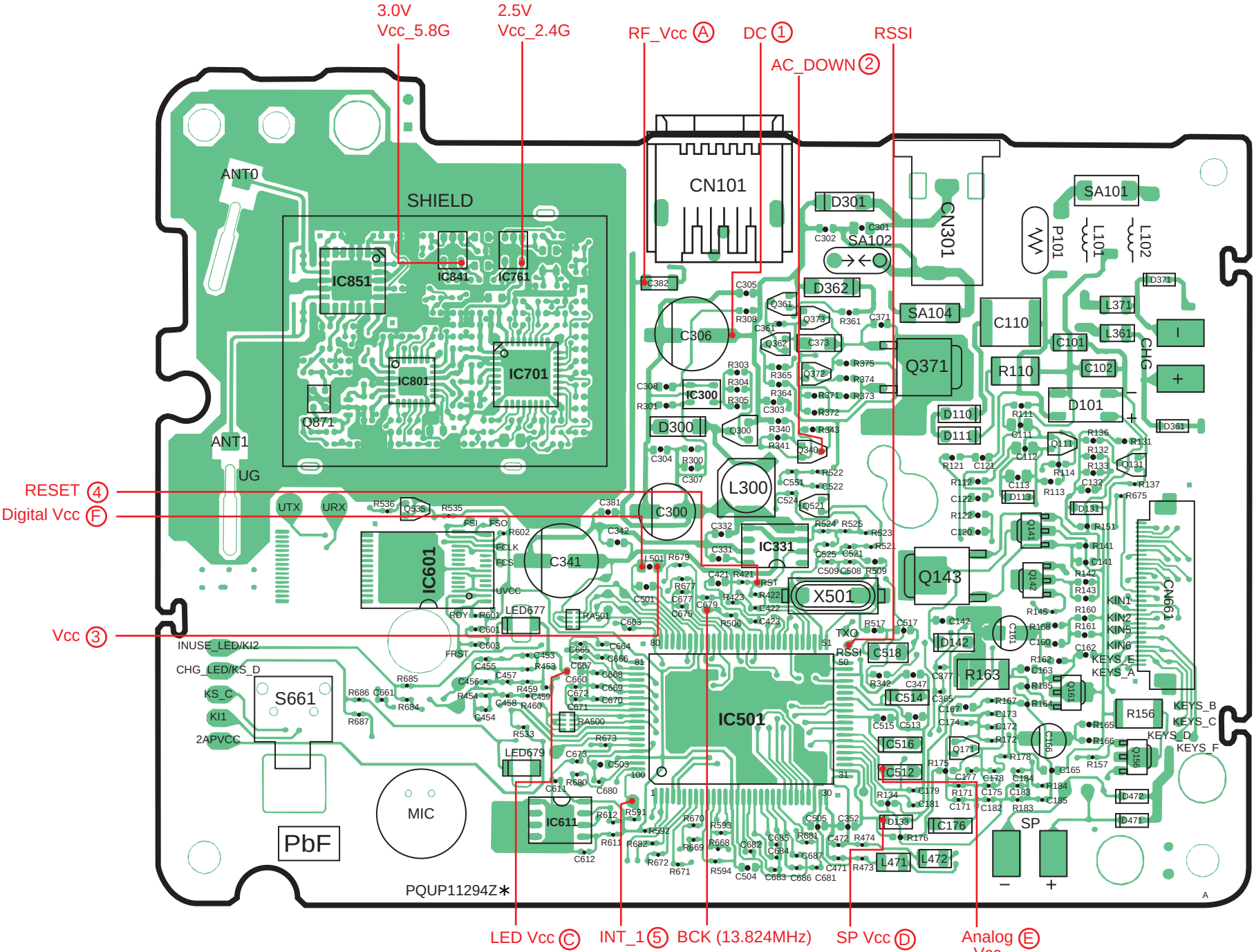
NC: No Components

KX-TGA551 SCHEMATIC DIAGRAM (Handset_RF Part)

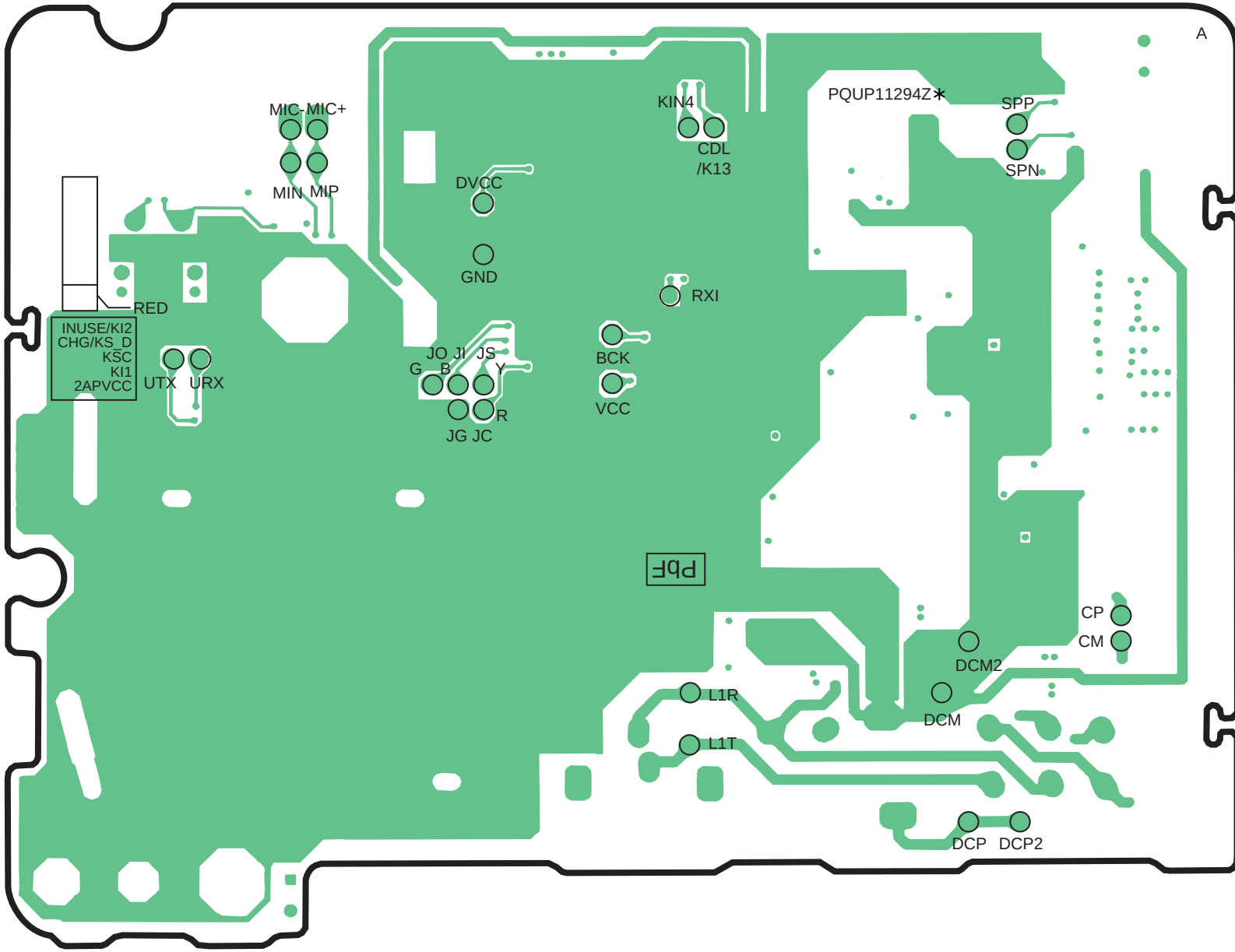


NC: No Components

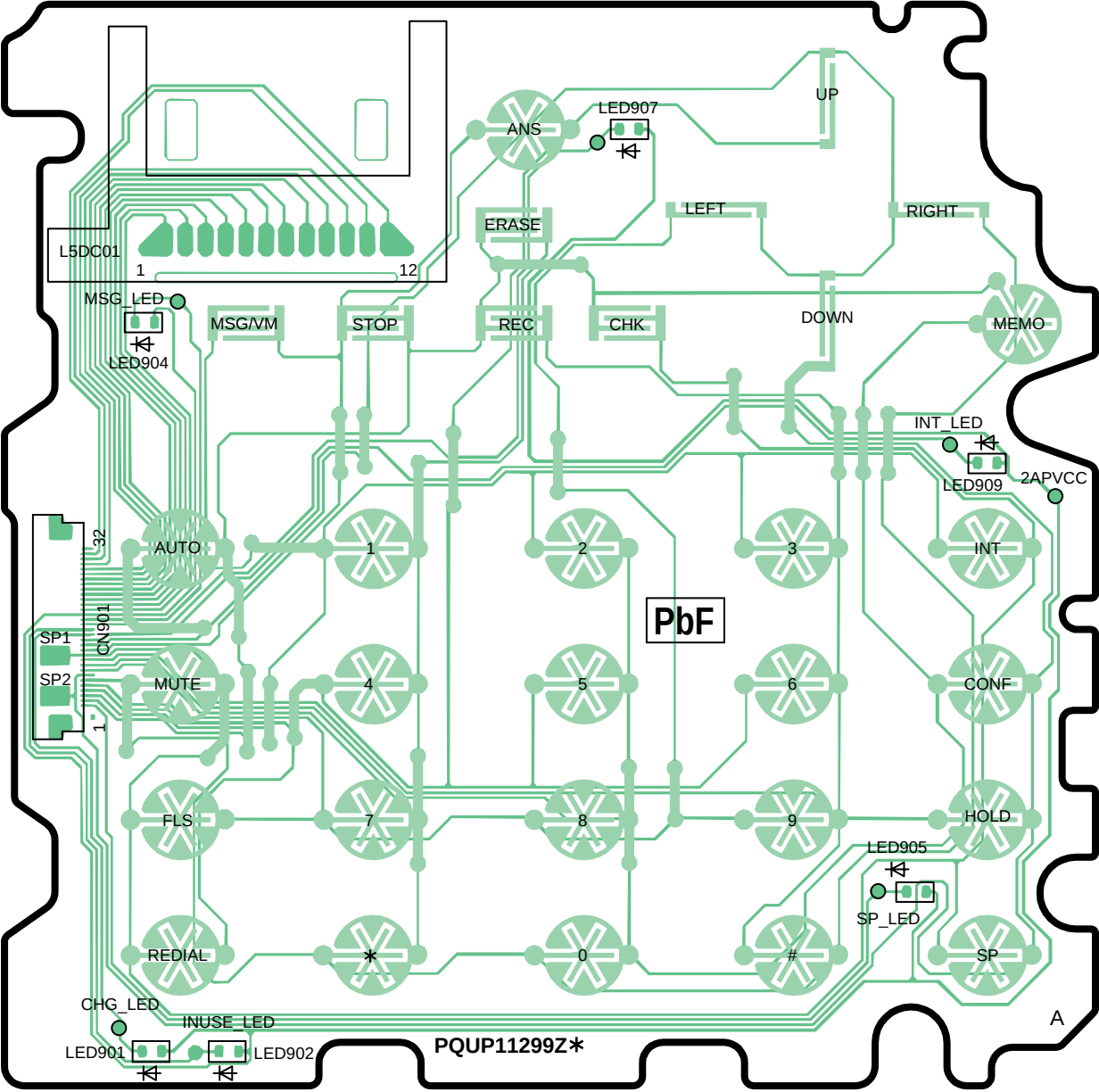
SCHEMATIC DIAGRAM (Charger Unit)



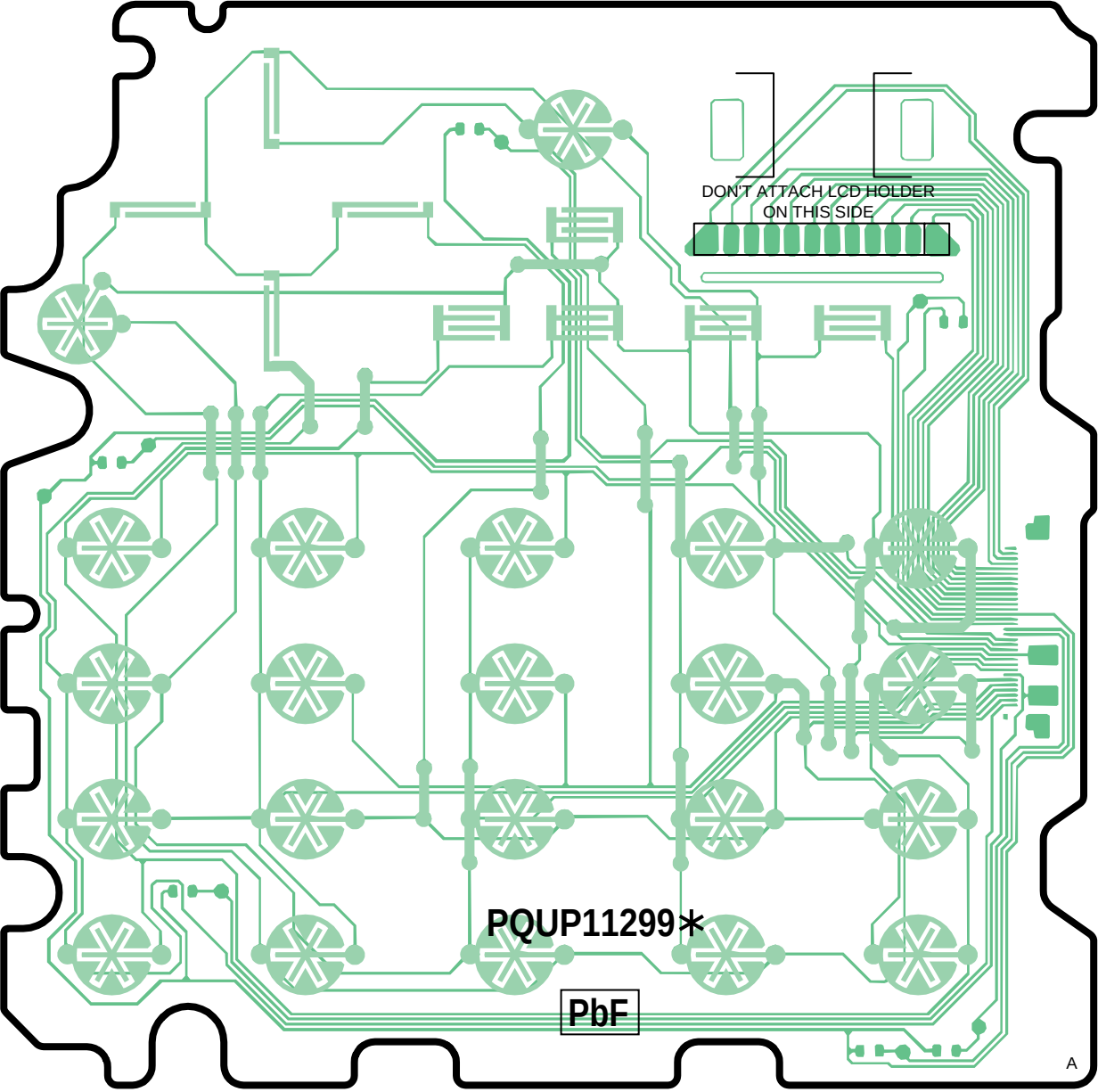
KX-TG5583 CIRCUIT BOARD (Base Unit_Main (Component View))



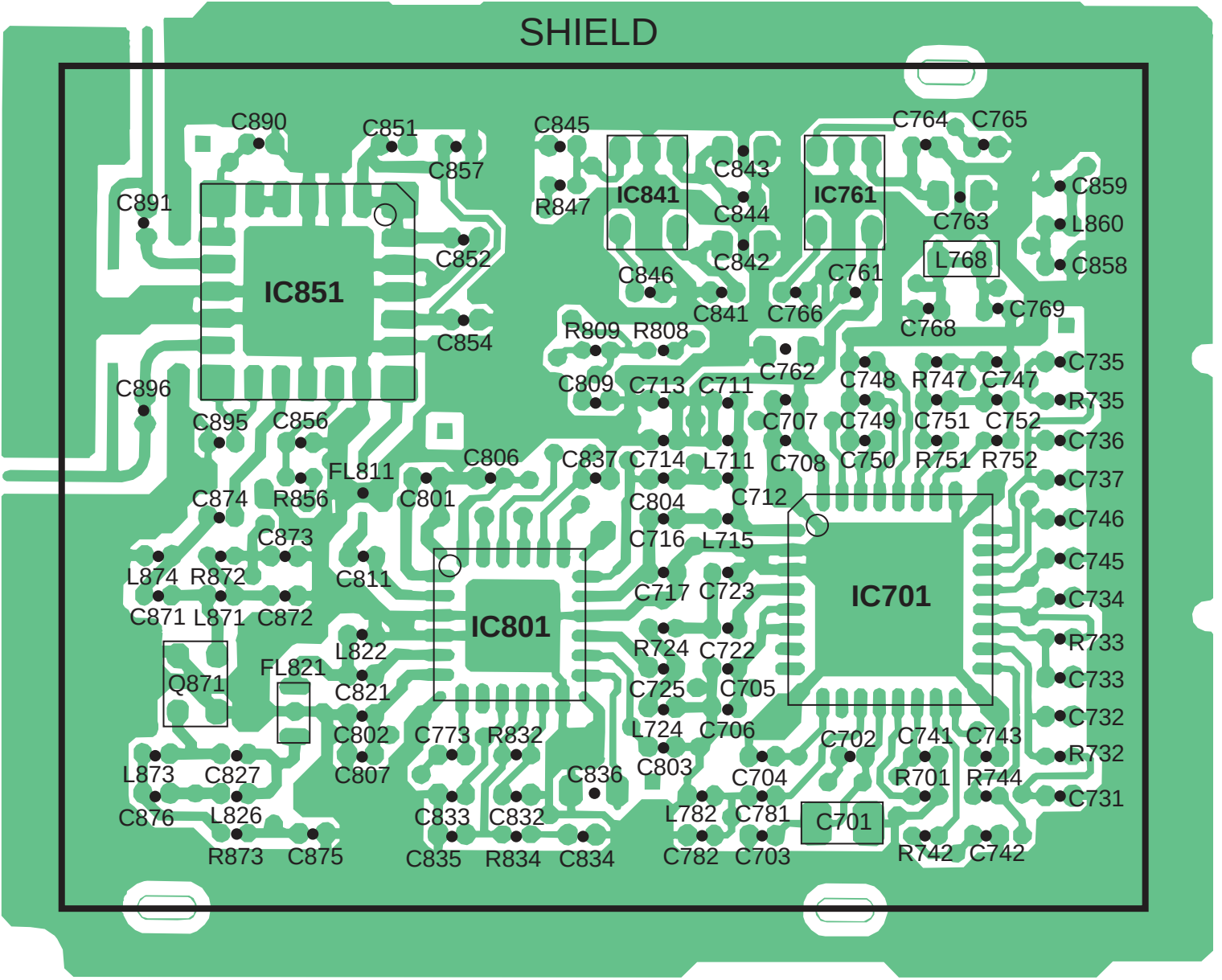
KX-TG5583 CIRCUIT BOARD (Base Unit_Main (Flow Solder Side View))



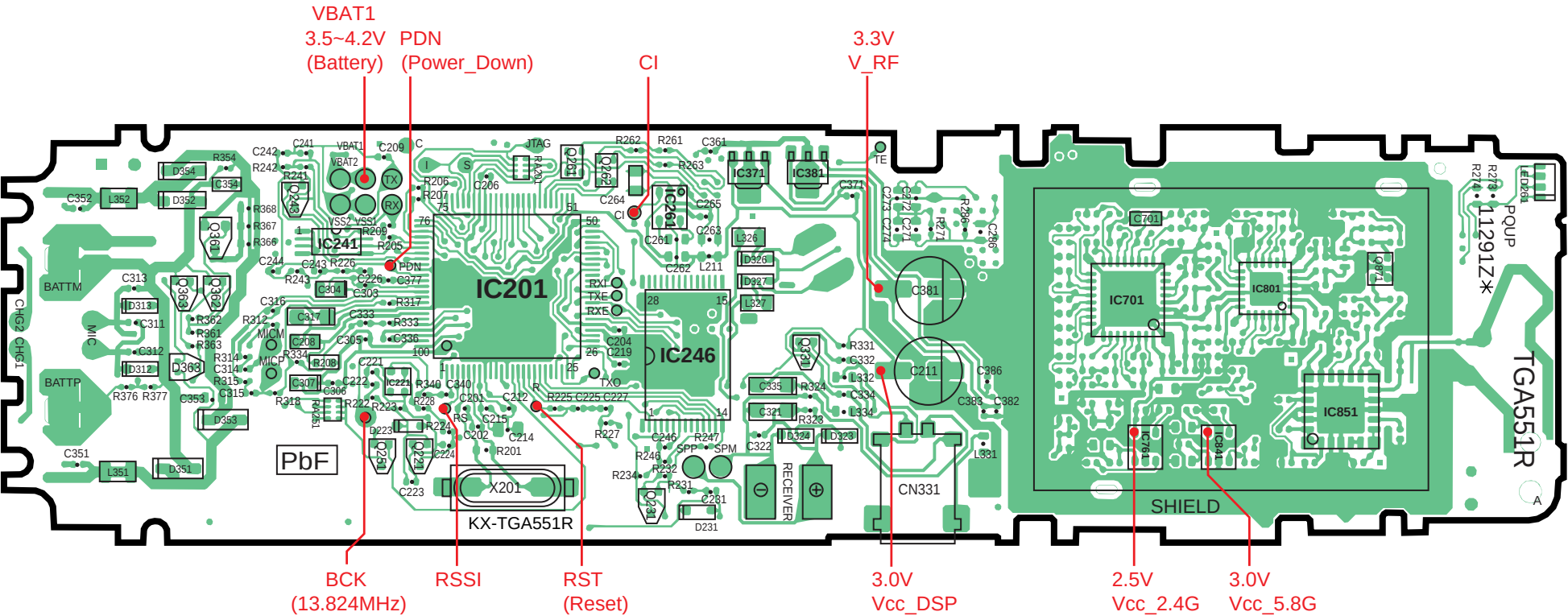
KX-TG5583 CIRCUIT BOARD (Base Unit_Operation (Component View))



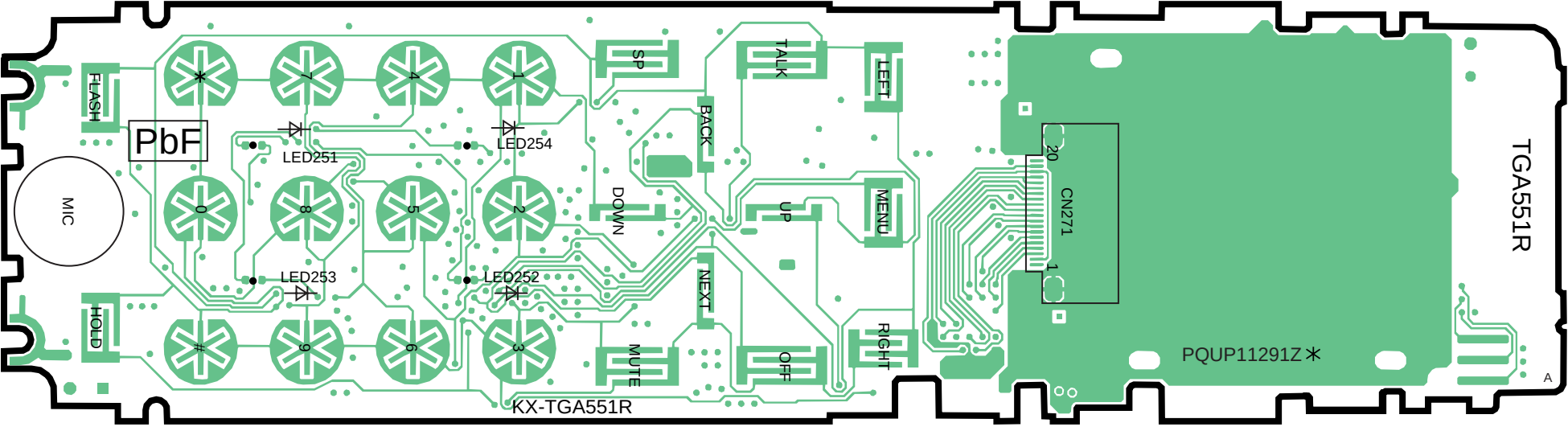
KX-TG5583 CIRCUIT BOARD (Base Unit_Operation (Flow Solder Side View))



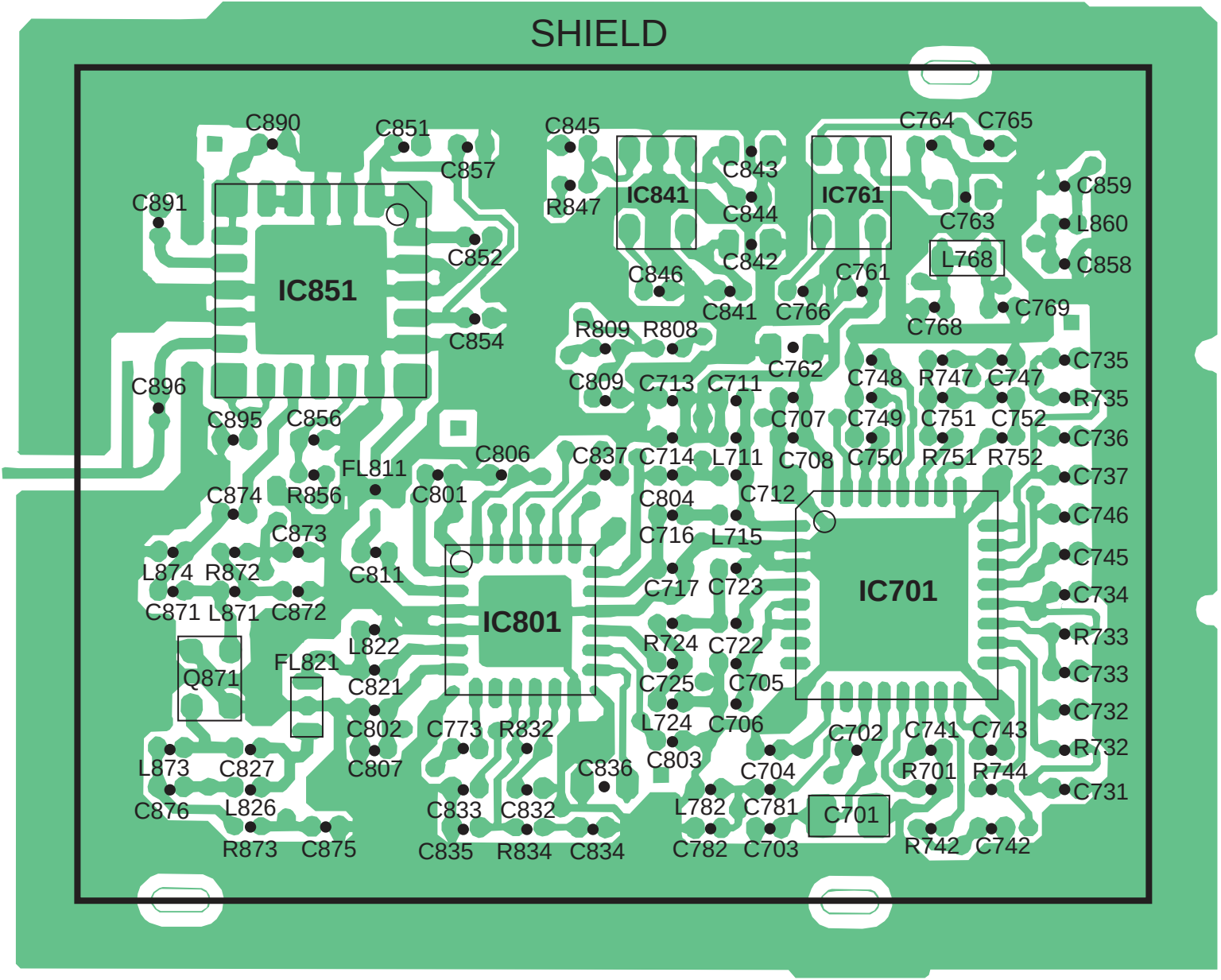
KX-TG5583 CIRCUIT BOARD (Base Unit_RF Part (Component View))



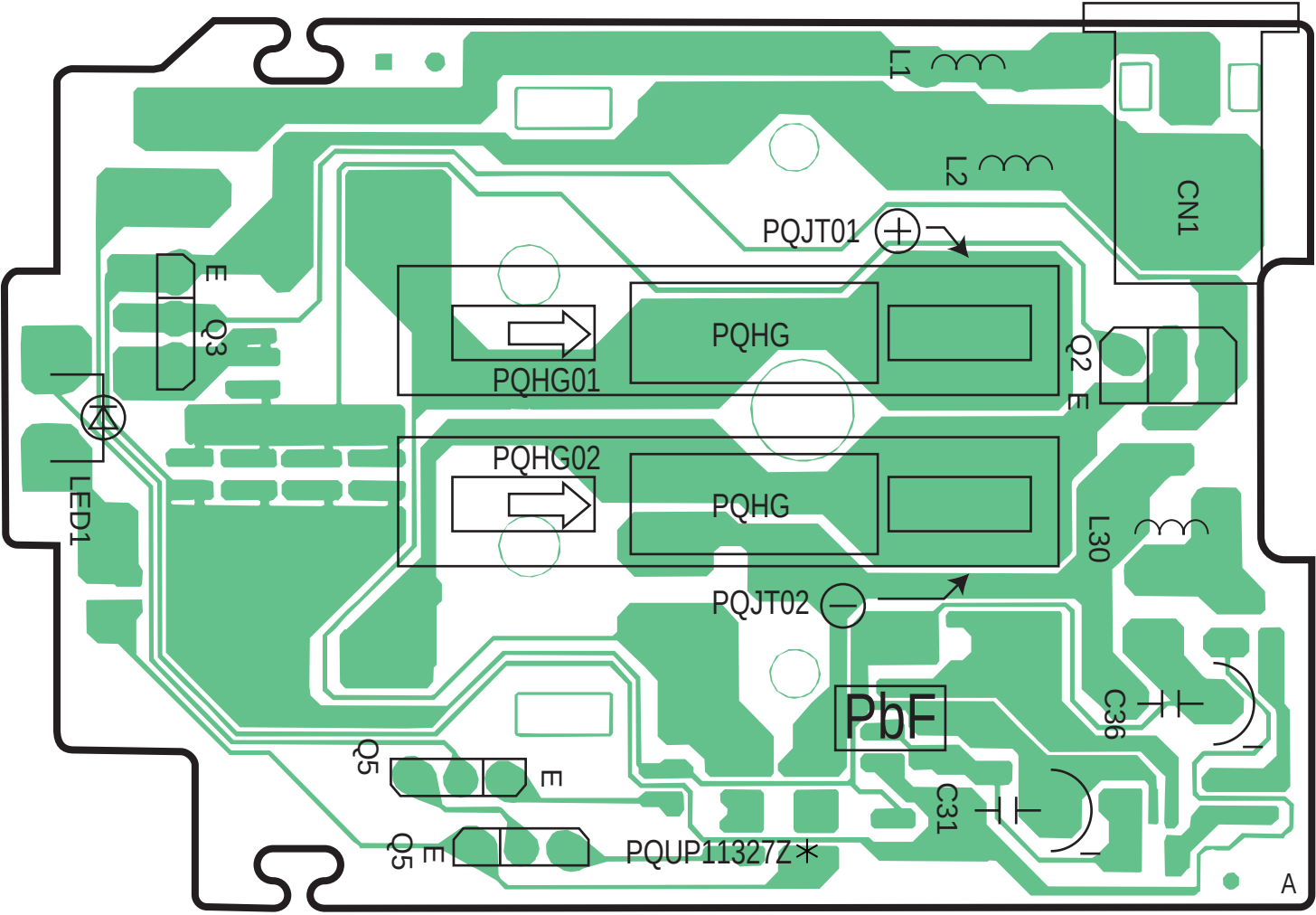
KX-TGA551 CIRCUIT BOARD (Handset_Main (Component View))



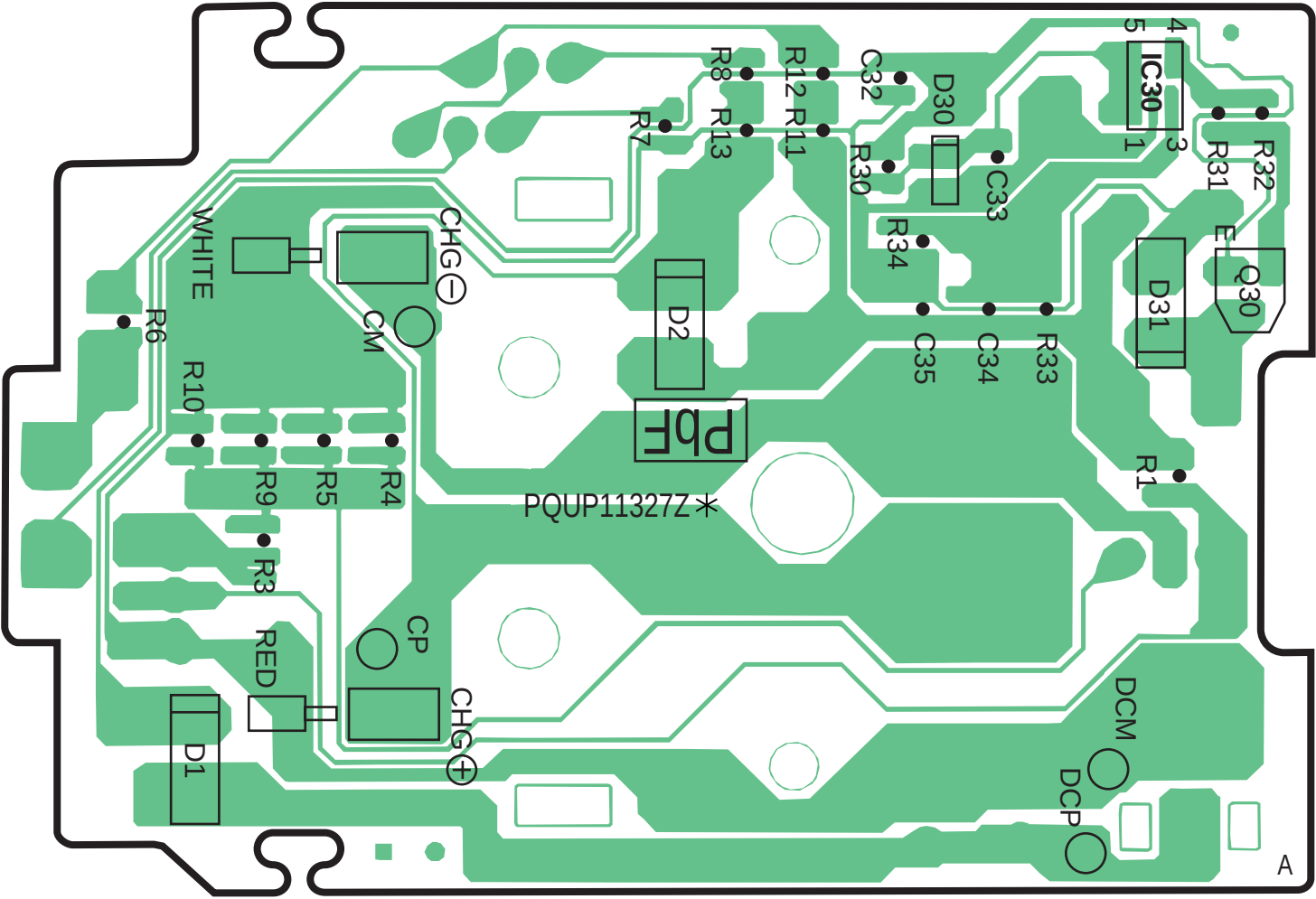
KX-TGA551 CIRCUIT BOARD (Handset_Main (Flow Solder Side View))



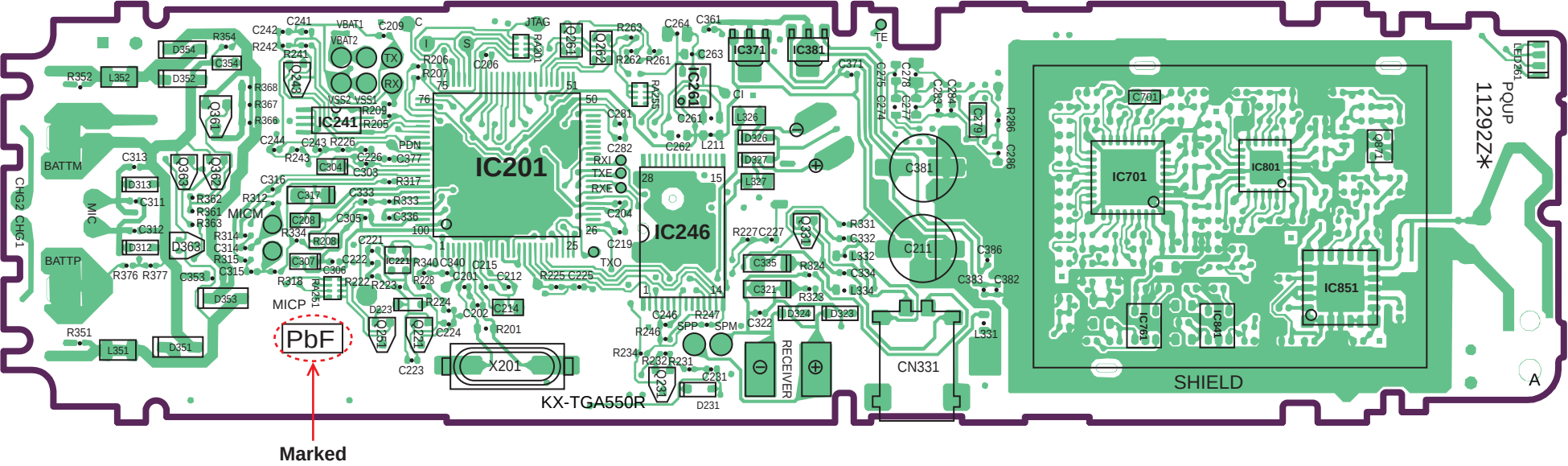
KX-TGA551 CIRCUIT BOARD (Handset_RF Part (Component View)



CIRCUIT BOARD (Charger (Component View))



CIRCUIT BOARD (Charger (Flow Solder Side View))


IC201
IC246
IC241
IC291
IC371
IC381
IC701
IC801
IC851
IC761
IC841
X201
KX-TGA550R
SHIELD
CN331
RECEIVER
PbF
Marked
BATTM
BATTP
MIC
MICM
MICP
CHG2
CHG1
TE
PQUP
112927*
A

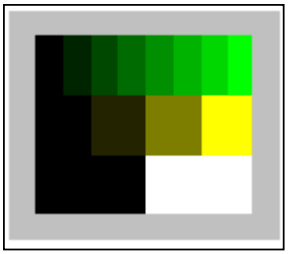
Power OFF

Press dial keys [1], [9] and [✳] simultaneously, and then Power ON.

LCD/LED Check

- LCD: Test Pattern is displayed.
- Antenna LED: Three colors are turned on in turn.

1.4 inch Color LCD



Press TALK

(Cancel)

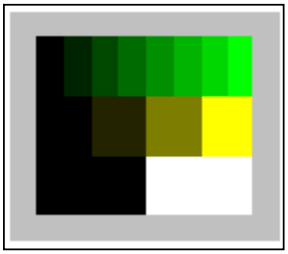
LCD Contrast Adjustment

- LCD: Test Pattern has been displayed.
- Antenna LED: Turns Off.

Push Up/Down the joystick to adjust the contrast.
Up: Increases the contrast.
Down: Decreases the contrast.

To set the contrast you adjusted, press SP.

A confirmation tone (long beep) sounds.



Press TALK

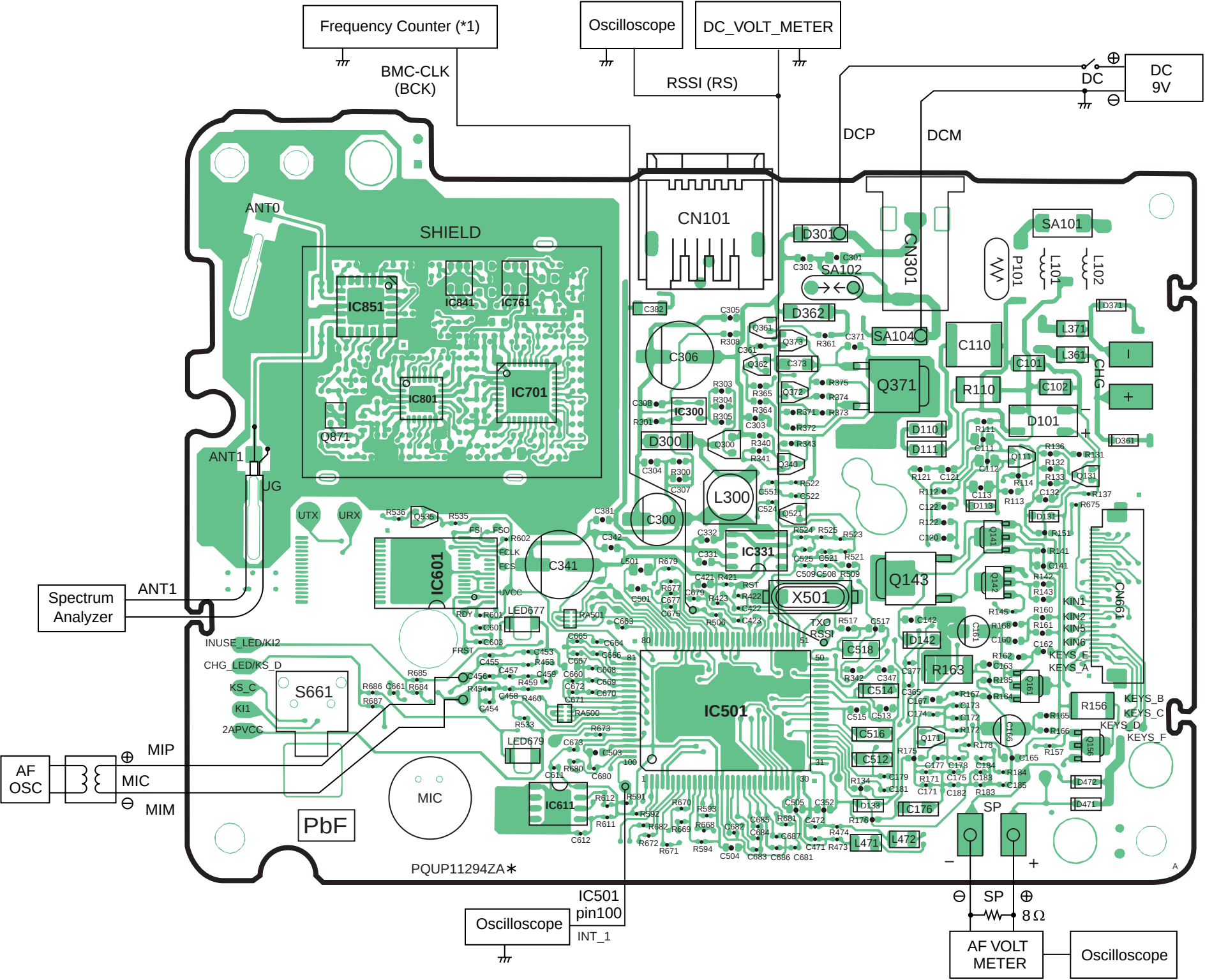
Key Check*

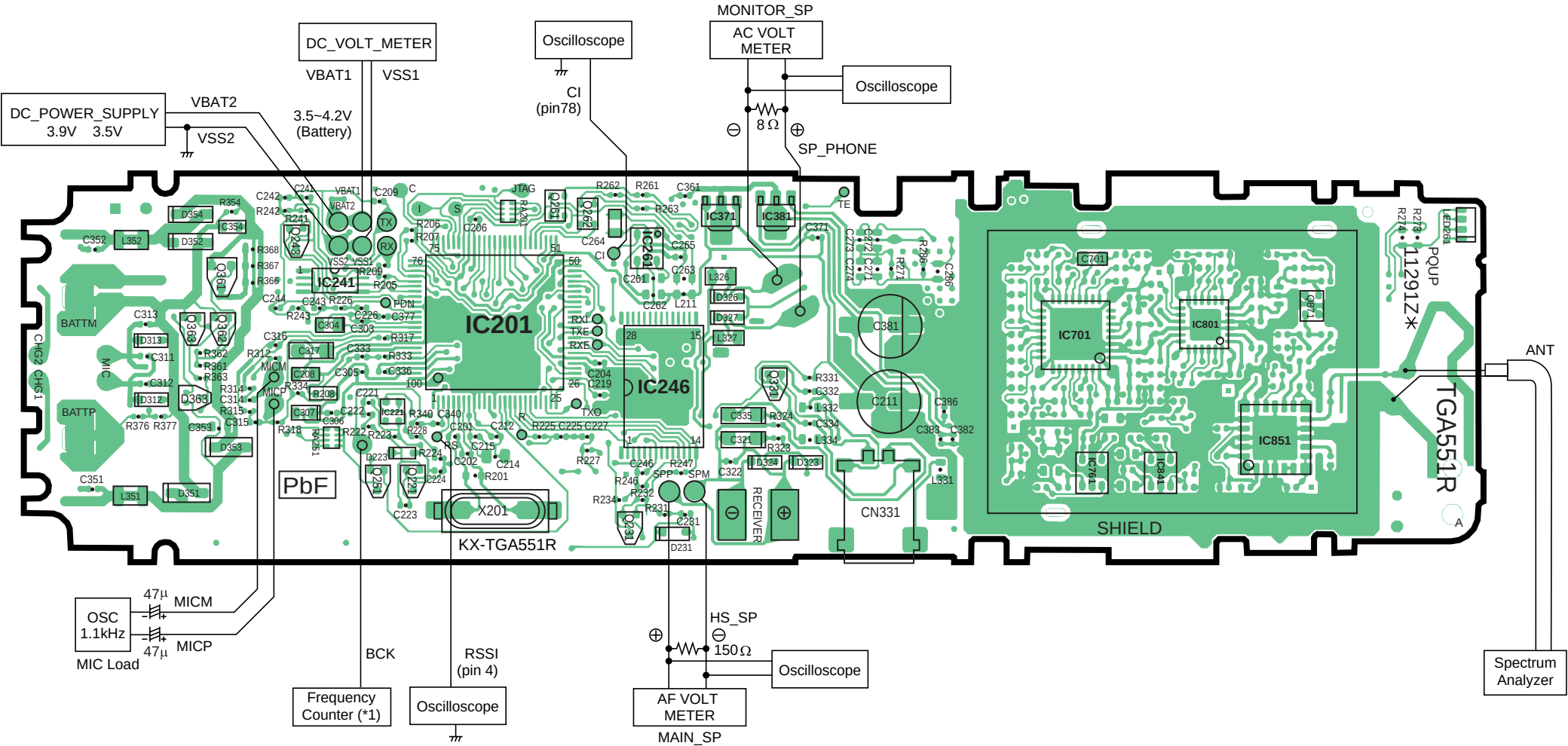
- LCD: Turns Off.

* Key Check is not necessary.
It is recommended to power off after setting the LCD contrast.

<<Remove the battery.>>

Power OFF


Frequency Counter (*1)
Oscilloscope
DC_VOLT_METER
BMC-CLK
(BCK)
RSSI (RS)
DC
DC
9V
DCP
DCM
ANT0
SHIELD
IC851
IC841
IC761
IC801
IC701
Q871
ANT1
UG
UTX
URX
CN101
D301
SA102
D362
SA104
SA101
P101
L101
L102
CN301
C110
C101
C102
L371
L361
D371
D361
CHG
Q371
R110
D110
D111
D101
C306
C300
IC300
D300
L300
IC331
X501
Q143
IC601
C341
IC501
R163
C518
D142
Q141
Q142
Q131
Q111
CN691
KIN1
KIN2
KIN5
KIN6
KEYS_E
KEYS_A
KEYS_B
KEYS_C
KEYS_D
KEYS_F
R156
Spectrum
Analyzer
ANT1
INUSE_LED/KI2
CHG_LED/KS_D
KS_C
KI1
2APVCC
S661
LED677
LED679
RA501
RA500
IC611
MIC
PbF
AF
OSC
MIP
MIC
MIM
SP
SP
8Ω
AF VOLT
METER
Oscilloscope
IC501
pin100
INT_1
Oscilloscope
PQUP11294ZA∗
A


DC_VOLT_METER
VBAT1
VSS1
Oscilloscope
CI
(pin78)
MONITOR_SP
AC VOLT
METER
Oscilloscope
8 Ω
SP_PHONE
DC_POWER_SUPPLY
3.9V 3.5V
VBAT2
VSS2
3.5~4.2V
(Battery)
IC201
IC241
IC246
IC371
IC381
IC701
IC801
IC851
KX-TGA551R
TGA551R
PbF
SHIELD
ANT
Spectrum
Analyzer
OSC
1.1kHz
47μ
MICM
47μ
MICP
MIC Load
BCK
Frequency
Counter (*1)
RSSI
(pin 4)
Oscilloscope
HS_SP
150 Ω
Oscilloscope
AF VOLT
METER
MAIN_SP